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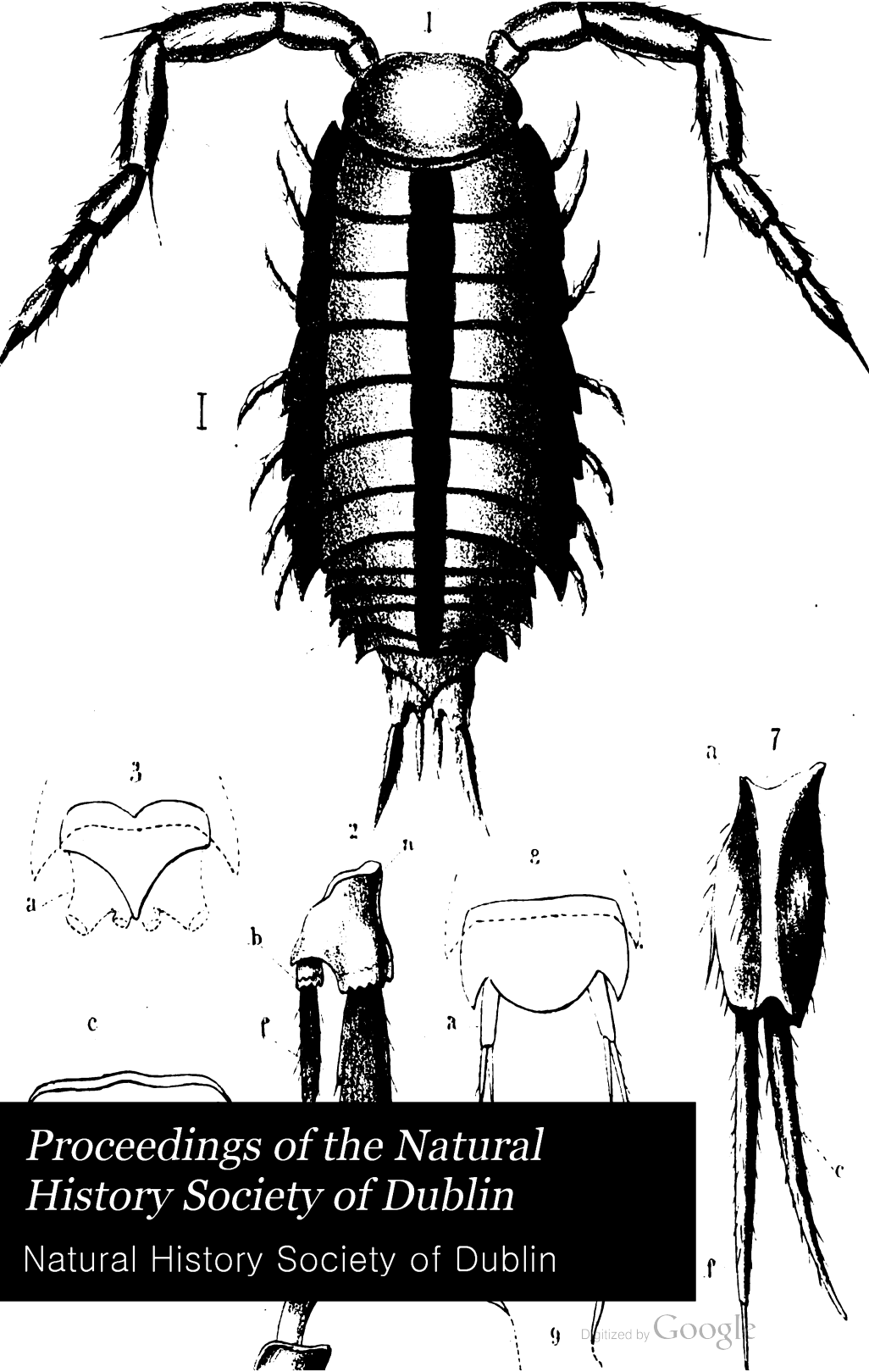
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Natural History Society of Dublin

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PROCEEDINGS

OF THE



NATURAL HISTORY SOCIETY OF DUBLIN,

FOR THE

SESSIONS 1856-1859,

(INCLUSIVE.)

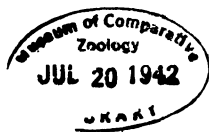
O Lord, how manifold are thy works! in wisdom hast thou made them all: the earth is full of thy riches.—PSALM civ. 24.

VOL. II.

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PROCEEDINGS

OF THE

NATURAL HISTORY SOCIETY OF DUBLIN,

FOR THE



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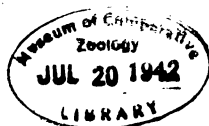
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PROCEEDINGS
OF THE
NATURAL HISTORY SOCIETY OF DUBLIN,
FOR THE
SESSION 1856-57.

FROM THE DUBLIN NATURAL HISTORY REVIEW, VOL. IV.

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DUBLIN NATURAL HISTORY SOCIETY.

SESSION 1856-1857.

ANNUAL GENERAL MEETING, NOVEMBER 14, 1856.

ROBERT CALLWELL, M.R.I.A., in the Chair.

THE Minutes of the preceding meeting having been read and confirmed,—

The Chairman stated that, before proceeding to ballot for the Officers for the ensuing Session, it was necessary for the Society to decide on the propriety of carrying out the suggestion of Council with regard to the proposed alteration in the constitution of the Society. He would call on the Honorary Secretary to read the rule and proposed alteration.

Dr. J. R. Kinahan, Honorary Secretary, read the rule and proposed alteration, as follows :—

Rules, section 1, clause 3.—“The Officers of the Society shall be chosen from the ordinary members, and shall consist [of a President, two Secretaries, and a Treasurer; and that these, with fifteen other ordinary members, constitute a Council.”]

For the latter part of this it was proposed to substitute :—

“That the Officers of the Society shall consist of a President (to hold office for one year only), four Vice-Presidents, two Secretaries, and a Treasurer; and that these, with thirteen other ordinary Members, shall constitute a Council.” The only alterations proposed were the nomination of four Vice-Presidents, and the reduction of the number of ordinary members of Council.

Mr. G. Sanders wished to know whether it was not irregular to entertain this motion without further notice to the members?

Dr. Kinahan read the Rules relating to this point, from which it appeared that due notice had been given by the Council of the proposed alteration in the Rules.

After some further discussion, it was proposed by the Rev. J. A. Galbraith, and seconded by J. Kift, Esq., and—

RESOLVED—That the words “to hold office for one year only” be omitted from the proposed alteration.

The Chairman then put the question—“That the Society do now proceed to ballot according to the list of Officers prepared by the Council,” which passed unanimously.

The ballot for Officers was then opened, during which the Chairman called on Dr. Kinahan (in the unavoidable absence of Mr. Andrews, Honorary Secretary) for the

ANNUAL REPORT.

GENTLEMEN,—Your Council, in laying before you this, the seventeenth Annual Report, have to congratulate you on the steady progress of your Society during the past year, as evidenced both by the accession of new members, and the valuable communications read at the meetings. During the past Session the following papers were read, the majority of which appear *in extenso* in the published Journal of the Society, now ready for distribution among the Members :—

In Zoology—"On Enterolithes," and "On Malignant Disease of the Bones in the Red Deer," Professor R. W. Smith; "On the Genus Skua," Dr. Farran; "On the Occurrence of the Common Bittern in the Co. Carlow," and "On Lepidoptera injurious to Granaries," James Haughton, Jun., Esq.; "On the Occurrence of the Egyptian Goose" (*Chenalopez vulgaris*); "On Edgemoulting," and "On Albinos," R. J. Montgomery, Esq.; "Rare Birds obtained in the Co. Louth," Lord Clermont (communicated); "On Change of Colour in Common Fowl," R. P. Williams, Esq.; "On Occurrence of *Thecla betulae* and *Gonypteryx Rhamni*, in Kerry," William Andrews, Esq.; "On Migration of Birds," Dr. Kinahan.

In Botany—"On *Asplenium fallax* of Lowe," and "On the Fungi of the West Coast of Ireland" (two papers), W. Andrews, Esq.; "On the Natural Affinities of Botrychium and Ophioglossum," and "On *Botrychium lunaria* and its Varieties," Dr. J. R. Kinahan; "On *Saprolegnia ferox*, and Disease caused thereby among Goldfish in Vivaria," Dr. Frazer.

In Mineralogy—"On the Analysis of Spodumene and Killinite," Rev. Professors Haughton and Galbraith.

The donations to your Library and Museum have been numerous. Among those to the latter may be particularly noted fine Irish specimens of the Egyptian goose, from Lord Clermont; and of the blackcap warbler, brambling, and common crossbill, from Edward Dombtrain, Esq.

Many new members have been added to your Society during the past year, and several of the former members have rejoined, whilst but one member has retired.

At the ordinary meeting held in January, 1856, your Society, at the recommendation of Council, determined to hold a number of extra meetings, of a more popular character than the ordinary meetings, to which ladies should be admissible. Accordingly, three were held, and the following papers read:—On April 23rd, "On the Ferns of Ireland, their Distribution and Mode of Cultivation," William Andrews, Esq.; on May 21st, "On the *Crustacea podophthalma* of Ireland, their Habits and Metamorphoses," Dr. Kinahan; and on June 25th, "On the Mollusca of Ireland," Dr. Farran. These meetings were numerous attended,

and were considered so satisfactory that your Council recommend the repetition of the experiment during the ensuing Session, the time for holding them to be fixed at the January meeting. Your Council have also, in virtue of the power vested in them, to recommend that the constitution of the Council be so far altered as to admit of the election of four Vice-Presidents, in addition to the President, heretofore annually chosen; and have, accordingly, recommended the four gentlemen whose names appear in the list for this office, by which arrangement they hope to obviate the inconveniences which have occurred during former Sessions, arising from the want of a fixed Chairman, especially at the popular meetings.

It was proposed by the Rev. Professor Haughton, seconded by James Haughton, Jun., Esq., and unanimously carried, that the Report now read be adopted.

Mr. R. P. Williams next submitted the Treasurer's Report for the past Session, from which it appeared there was a balance of 14s. 7d. to be carried forward, and that £20 (subscriptions) was still due, and that the reserve fund amounted to £58. Mr. Williams further stated that thirteen new members had joined during the past session, and three former members had rejoined, whilst but one member had retired from the Society. The balance to their credit would have been much larger but that a new item appeared in the account of this year, viz., that for publication of the Society's "Proceedings." This additional outlay, he hoped, would be met by the accession of new members. He might mention that four gentlemen were to be balloted for that night, and notice of three others had been given for the next—an evidence that the ensuing Session would be equally successful. Another important matter was, that the collection now contained so many rare specimens, that it was considered advisable to insure it against accidents, and the property had accordingly been insured for £500, which would, no doubt, be deemed satisfactory to the present, and encouraging to the future members.

The Report having been adopted,—

The Chairman declared the following members unanimously elected as Officers of the Society for the Session of 1856-7 :

President—Professor William H. Harvey, M.D., M.R.I.A.

Vice-Presidents—His Grace the Archbishop of Dublin; Lord Talbot de Malahide, M.R.I.A.; Sir Edward B. Borrough, Bart., M.R.I.A.; C. P. Croker, M.D., M.R.I.A.

Council—John Aldridge, M.D., M.R.I.A.; Robert S. Barklie; Henry M. Barton; F. W. Brady; Robert Callwell, M.R.I.A.; James R. Dombrain; Charles Farran, M.D.; Samuel Gordon, M.D., M.R.I.A.; Rev. S. Haughton, F.T.C.D., M.R.I.A.; Robert J. Montgomery; George B. Owens, M.D.; Gilbert Sanders, M.R.I.A.; Joseph Todhunter.

Treasurer—Richard P. Williams, Esq., M.R.I.A.

Secretaries—William Andrews, M.R.I.A., and John R. Kinahan, M.B.

The meeting was then made special, for the purpose of balloting for members, and the following were declared duly elected:—Edwin Birchall, Esq., Dublin; J. Neligan, Esq., Tralee; Robert Roberts, Esq., Harcourt-terrace; J. B. Doyle, Esq., Dublin.

The meeting then adjourned to the month of December.

FRIDAY, DECEMBER 12, 1856.

HIS GRACE THE ARCHBISHOP OF DUBLIN, V. P., in the Chair.

The Minutes of the previous Meeting were read and signed.

HIS GRACE THE ARCHBISHOP OF DUBLIN read a paper on—

THE SONG OF THE BUTCHER-BIRD.

It is not my intention to-night to enter into the natural history of the entire family of butcher-birds, or shrikes (Laniadæ). I merely wish to bring under the notice of the members of the Society a few notes which were made during the month of July last, at Cheltenham, with regard to the song properly so-called of the lesser, or, more properly speaking, the red-backed shrike, or butcher-bird (*Lanius collurio*); and, although I know that it is a rule of this Society that the communications read before it shall be confined to Irish natural history, yet, as a congener of this bird (*Lanius excubitor*) has occurred already, on one occasion at least, in Ireland, I hope I may be allowed to infringe on this rule a little.

Although many authors mention the imitative faculties of the butcher-birds, in respect to the cries of other birds, yet they all say that this faculty is limited to the imitation of the cries and calls only. The only naturalist who at all notices any other power of imitation is Temminck, who, in his "History of Birds," enters fully into the subject. It is rather strange so remarkable a habit should have escaped notice.

The following were the notes which I made on the subject:—Last July, when riding along one of the roads near Cheltenham, I was surprised by hearing, as I thought, a blackcap (*Curruca atricapilla*) singing in a thicket, and, struck with the strangeness of the circumstance, at that season, when all birds are supposed to be mute, I cautiously approached the bird to make sure of its species: much to my astonishment I found that the musician was the lesser shrike (*L. collurio*). On listening awhile, to my still greater astonishment, I heard this bird, dropping the song of the blackcap, take up a most perfect imitation of the song of the sedge-warbler (*Curruca phragmites*); then, successively, the songs of the thrush (*Turdus musicus*), skylark (*Alauda arvensis*), and whitethroat (*Curruca cinerea*), winding all up with the call-note of the partridge (*Perdix cinerea*).

Nor was this the only occasion on which I was able to note this curious trait in the bird's habits. On many subsequent occasions I witnessed similar concerts, in every case being able to identify the bird,

thanks to its fearlessness, and thus verify my observation. The mere fact of this bird's imitating the songs of its more favoured brothers of the grove is a remarkable point in its history, as well as the singularity of the season chosen for the display of this faculty—to wit, a time when all other birds have ceased their song. This songster may well deserve the name of English mocking-bird, and it appears strange that so interesting a habit should have escaped the observation of our English ornithologists, or else have been deemed too unimportant for notice.

After some discussion, Dr. CHARLES FARRAN read a paper—

ON THE OCCURRENCE OF THE MARBLED SWIMMING-CRAB (*PORTUNUS MARMOREUS*), AT BIRTERBIE BAY, CONNEMARA.

IN bringing this beautiful species, the marbled swimming-crab (*Portunus marmoreus*), under the consideration of the Society, I was nearly placing myself in a very unenviable position—namely, that of appropriating to myself the credit of adding the species to the Fauna of Ireland—this position resembling in every respect that of the jackdaw (as we are told in ancient writing), who found himself, when the rightful owners of the plumage with which he decked himself claimed their respective properties, left naked and despised.

Most fortunately, a reference to the printed reports of the Proceedings of the Society for the years 1844 and 1845 saved me from this galling infliction, which would have been doubly painful to me, since it fell to my lot to read a paper by the late Mr. William M'Calla, before the Society, in January, 1845. By reading that portion of the report which refers to Mr. M'Calla's discoveries, the Society will be put in possession of the fact that his was the undoubted credit of being the first to place *Portunus marmoreus* on the list of Irish Crustacea.

The following is the extract :—"In the month of January, 1845, Dr. Farran read a paper—Observations on the Productions of Roundstone and Birterbie Bays, Connemara, chiefly the Crustacea, Sponges, and Zoophytes, by Mr. W. M'Calla, being a continuation of Dr. Farran's paper on the rare shells of that district. In that paper a well-arranged list was given of Irish Brachyura, detailing twenty-seven species, and one undetermined species and genus [*Thia polita*]. By this list Mr. M'Calla has added a species to the Fauna of Ireland—*Portunus marmoreus*—and another not referable to any hitherto known genus of British Crustacea. The additions to those already recorded make the Irish Brachyura to amount to thirty-three species. Among the other sections of the Crustacea he alluded to the occurrence of *Nisaea bidentata*, particularly in the button-like front of *Himanthalia lorea*, and also to that of the very interesting species, *Nebalia herbstii*, found under stones and lumps of turf at the head of the bays." I have given the extract in full, so far as relates to the two bays, as it gives some slight insight into Mr. M'Calla's laborious investigations, which he conducted with great skill and tact. I now return to the discovery of *Portunus marmoreus*, the merit of which discovery has not been duly estimated. There is no difficulty in deter-

mining the species when brought under view, such as I now exhibit; but when it is stated that a strand-worn carapace, in which the beautiful markings which characterize the species were almost obliterated—when the species was not even suspected to exist, and when I am perfectly satisfied that M'Calla never saw the crab, not a specimen being in any Irish collection—under these circumstances, his detecting the species, with such meagre materials to assist him, demonstrates his great discriminating powers. The carapace is placed in the Museum of the Royal Dublin Society, where it can be seen.

It may be held in remembrance that I read a paper before the Society early in the session of 1854, giving an account of a dredging excursion I made in that year to Roundstone and Birrterbie Bays. I detailed the reasons which induced me to take the course which led to the discovery of the locality where the magnificent specimens of *Pectunculus glycymeris* were obtained so abundantly. With those were associated *Portunus marmoreus*, rivalling the *Pectunculus* in those exquisite markings which so characterize that species, and excelling it by the graceful evolutions and attitudes it assumed both in the water and on the deck of our vessel. A more interesting object could not be witnessed. It was obtained rather plentifully; four or five specimens were captured in each haul of the dredge, and as I was highly favoured that year by fine weather, these were rather frequent; and I should say that I obtained above one hundred in the course of the day. It is not necessary to allude to the reason why I did not preserve some specimens; probably I was so occupied with the *Pectunculi*, and other rarities that came under my notice, that I passed them over. I was aware of the great difficulty in preserving the colours of the shell, so as to render them worthy of a place in a museum, and this also tended to make me indifferent to them.

On my return to town I mentioned to several naturalists the fact of my having obtained this hitherto rare crustacean; and, although I cannot say that I was actually doubted by any, still there can be no hesitation in saying that the production of some specimens would have strengthened their faith exceedingly. I proceeded to Roundstone last July, in order to obtain the *Portunus*, and to ascertain whence M'Calla procured the carapace. Never was there a better exemplification or fulfilment of the old adage—

“He who would not when he may,
When he would, he shall have nay.”

The very first day I went out we were overtaken by a gale, indeed, the men called it a hurricane, which compelled us to put into the first shelter we could reach. The next day was a dead calm, and so on for a fortnight alternate storm and calm. One day, for an hour or two, I was fortunate in having a favourable breeze, when I reached the *Pectunculus* ground. During that time I obtained three specimens, and it was significantly observed by one of the men, that it required the boat to be under good way to catch the crabs, as it was only then they were

brought up in the dredge; for when the speed was slackened, we got *Pectunculus*, but no crabs; and this I suppose was the literal fact. The depth of water was about twenty-two fathom, and the bottom a hard yellow sand.

When I asked the men whether M'Calla had ever dredged there, they said he never had; and when I inquired where he could have obtained the carapace, they at once replied at Gurteen strand, about two miles from the spot, that being the only spot where *débris* was thrown up. They also mentioned that the dredge he had was small, and would not sink here, as the current was so strong, and this I found to be the case. It is in vain to go with the current or against it—in the first case the net is reversed and goes before the dredge; in the latter case the dredge floats, and, should it reach the bottom, it hops, and never lies permanently on the ground; the current must be crossed, and this requires a good vessel, a heavy dredge, and good men to work it, and these M'Calla never had, owing to the rather heavy expenses attending them, so that, from this account, it would appear that the animal lived and died on this bank, and was carried by the current and thrown on Gurteen Strand, and there found in its mutilated state by M'Calla, who had thence determined the species. I have now given an account of the capture of the crab, and its locality. It appears to me that a current is its domicile—it is never found in the sluggish waters of either bays, where *Portunus corrugatus* is found abundantly. It is a very active crab, and it behoves it to be so, as the current which carries its prey runs at the rate of seven or eight miles an hour. We have seen that it has activity enough to avoid the dredge when the vessel was not under very rapid way.

I alluded to the difficulty of preserving the colours of the Crustacea. I am happy to say that that is now removed, and henceforth this class of animals will grace our museums in all their varied and beautiful colours. I am indebted to Colonel Wegg for being in a position to show the result of his scientific applications. Immediately on getting those specimens, I packed them up in a small box, filling up the remaining space with fresh chopped sea-weed (*Fucus vesiculosus*), and forwarded them to him by mail. His success was far beyond my most sanguine expectation. The specimens are in appearance this moment as fresh as when taken, nearly six months since.

Before I close, I may be permitted, in the words of Bell, to say—"that the portion of the crab denominated the carapace is the outer shell or the large enveloping buckler which covers the entire of the thorax; and even the abdomen itself is folded underneath it, so that the whole animal is hidden by it. This remarkable buckler, covering as it does the whole of the viscera, is found to be more or less divided distinctly into regions, which are indicated by elevations separated from each other by grooves, and to these regions have been given names derived from the different organs which are immediately covered by them."

In the species *Portunus marmoreus* the abdomen in the male is five-jointed; in the female, seven-jointed.

Mr. Andrews said that the thanks of the Society were due to Dr. Farran for his perseverance in following out the important discovery of the late William M'Calla, and for the very beautiful series of *Portunus marmoreus* he had brought before the meeting. Mr. Andrews was not at all surprised at Dr. Farran's meeting with that beautiful crustacean in such abundance on the west coast; it was only confirmatory of the identity of many other marine animals of that coast with those of the shores of Spain and the Mediterranean. But a very superficial research had as yet been made among the Crustacea of the coasts of Ireland, especially those of the west coast, where by far the greater proportion of species of British marine animals were doubtless to be met. This dearth of information was chiefly owing to the few trials of the dredge in deep water; for the rarer animals might be taken there, and, even at the depths of eighty fathom, some of the most delicate crustaceans would be found.

In eighty-four fathoms, off the Tiraght Rock, in fine gravelly soundings, *Pandalus annulicornis* and *Palæmon serratus* had been taken; they were particularly abundant in the stomachs of the cod-fish; species of Hippolyte and of Mysis, *Pirimela denticulata* and *Hyas coarctatus*, were also taken. In Dingle Bay, in twenty-five fathoms, on the trawling ground, on fine sand, *Corystes cassivelaunus* and *Maia squinado* are constantly taken up with the trawls. Mr. Andrews begged to present to the Society some specimens of *Portunus puber* and *Portunus holsatus*, taken in Dingle Bay. A specimen of the latter so closely approached in distinctive characters *P. marmoreus* as scarcely to be distinguishable from it. Associations ought to be formed for exploring more effectively the marine productions of the west coast, as off the bays of Galway, Dingle, Ballinskelligs, and Kenmare, in soundings of from forty to sixty fathoms, good dredging ground would be met on fine gravelly bottoms, fine sand, and soft sand and mud. It was in eighty-one fathoms he had taken the living specimens of *Eunice tubicola*.

Dr. Kinahan stated that the addition of this species to the Irish list was not the least interesting among the many additions made by the late M'Calla. It was most gratifying to have M'Calla's locality for this interesting species placed thus completely above suspicion, and Dr. Farran doubtless deserved a great deal of credit for his perseverance in endeavouring, in spite of unfavourable circumstances which he had detailed, to prove this point.

From a careful examination of Dr. Farran's beautiful series of specimens, he felt no hesitation in venturing to dissent altogether from both Bell and Milne Edwardes as to the specific identity of *P. marmoreus* and *P. holsatus*; no one who examined these beautiful specimens could for one moment imagine that the species were identical. The distribution of the species was distinct too, for *P. holsatus* was much more generally diffused and more northerly in its distribution than *P. marmoreus*, which as yet had been only found in the southern parts of Britain.

After some further discussion, Dr. J. R. KINAHAN read a paper—

ON *XANTHO RIVULOSA* AND OTHER DECAPODOUS CRUSTACEA OCCURRING AT
VALENTIA ISLAND, CO. KERRY.

In recording this, the second notice of the occurrence of *Xantho rivulosa* on the Irish shores, I mean to take the same opportunity to submit to your Society such notes with regard to some of the more remarkable Crustacea which occur at Valentia Island, as a hurried visit to that locality last summer, under unfavourable circumstances, afforded me, combining with them remarks on the distribution of the species around Ireland generally, as far as the scanty materials at my command will enable me to do. These, though imperfect, I am led to lay before you, chiefly by the great lack of information on this subject which I find pervades all our Natural Histories, even those very lately published.

It is a matter much to be deplored, that naturalists generally do not oftener avail themselves of opportunities of compiling comparative tables of the productions of the various districts they may examine; but, instead thereof, sinking the naturalist in the mere collector, rush rather after a multitude of specimens or species than a limited number of general facts. I do not wish to undervalue the collector's labours, but rather to prompt every collector to become a naturalist also, and by carefully noting the special peculiarities of each district which he examines, to enable himself and others thereby to arrive not only at particular conclusions as regards that locality, but also at general ones as regards the Fauna of the entire country, and its bearings on the Fauna of the whole world. That the importance of this matter is not overrated must be apparent to any one who takes the trouble to examine even the best arranged books of modern days, with regard to the distribution of our marine animals, and (with, perhaps, the exception of the Molluscs) the deficiency of authentic information will be apparent on even a superficial examination, this deficiency in a great measure arising from observers having sought and noted the rarest, or what they considered the rarest species, only.

The principal data on which the following remarks as to distribution are founded are as follow :—For the north of Ireland generally, the specimens in what is commonly known as the Ordnance Survey collection, or Down Survey collection,—a collection made by the officers of the Ordnance Survey of Ireland, under the direction of Captain, now Colonel Portlock, during the years 1839, &c., in the counties of Donegal, Antrim, Down, and Londonderry, and which is at present in the Museum of Irish Industry. Where this is referred to, the letters O. C. are placed after the locality.

For the east coast, my own experience of Dublin Bay, assisted, in a very few instances, by the collections of Dr. Ball and other kind friends.

For the south, my own experience in Youghal and Ardmore, and also J. V. Thompson's collection of Crustacea, now in the Royal Dublin Society's Museum; and also the Catalogue prepared by the Cork Cu-

vierian Society in 1849. These two latter are referred to as J. V. T. and C. C. S. My own notes are, in every case, unmarked, the locality being given without any initial.

For the west, in addition to my own notes made at Valentia Island, in 1856, and at Kilkee, Galway, &c., in 1852, I have also made use of a catalogue, supplied me some years since through the kindness of Dr. Farran, of the principal species captured by W. M'Calla in Birterbie and Roundstone Bays, marked by the initials W. M'C.

Correcting and adding to all these various sources from Bell's British Crustacea, and William Thompson's Notes on the subject, as given posthumously to the world in the fourth volume of the "Natural History of Ireland." This last has been noticed as W. T.

The list by no means purports to be a complete distributional one; a task so comprehensive must be left for the future; but is merely intended to notice such species as either came directly under my own observation while living, or of which specimens, concerning whose authenticity there could be no doubt, were seen by me.

So much has lately, that is to say, within the last few years, been said and printed concerning the superior capabilities of the west of Ireland as a field for research, that naturalists have been insensibly led to look on it as the El Dorado of Irish Natural History, where "monster nuggets," in the shape of new species, and rare animals and plants, are tossed up by every tide and breeze; the usual answer of the old hands and authorities to the anxious inquirer seeking information regarding the *locale* of some rare species "Common in the west," helping to foster this opinion, so that every naturalist could not but feel impatient for an opportunity to examine into and revel amidst such treasures. Any one who has felt the pleasure of breaking ground in a comparatively new and seemingly rich field can quite appreciate the feelings with which I gladly accepted an invitation to spend a few weeks at Valentia Island, which, embayed as it is in an inlet of the Co. Kerry, ought to furnish the carcinologist with every species which frequents the coast.

Among the many species marked as Irish, on the authority of the occurrence of a single specimen, none, with, perhaps, the exception of *Polybius Henslowii*, possess more interest than the subject of this notice, *Xantho rivulosa*, one of the types of a genus which, essentially subtropical, reaches its northern limit on the British shores, itself an undoubted member of that Fauna whose scattered members, in characters not to be mistaken, attest the probability, nay, almost the certainty, of the truth of one of the most brilliant theories ever propounded,—that of the lamented Edward Forbes,—surmising the union and intermingling, at some period of the world's history, of the Fauna of the west of Ireland and Mediterranean districts; add to this the fact of its having been detected hitherto in Ireland only at the extreme north, and that, when then discovered, now fifteen years back, a second specimen was sought in vain; that during this long interval it has remained undetected, escaping the careful research of even W. M'Calla (at least, it neither appears among his lists, nor can I find specimens of it in the

many collections supplied by him), and, therefore, evidently either very rare or very local.

Taking these latter facts into consideration, it appeared to me, when starting for Valentia Island, with the determination of seeking this species, that it was rather a wild-goose chase, and the chances of success but small; and my experience at Valentia Island would lead me to believe that either the species is everywhere scarce, or else, what is just as probable, that it, in its habits, differs much from those of *Xantho florida*, and that its scarcity in collections depends on the blundering of the collectors. Although I assiduously sought for it, but one specimen rewarded my labours,—that now before you,—sufficient, however, to prove the existence of the species on the coast, and to stimulate a further search at some future time.

The general aspect of the shores of Valentia Island needs little description: every form of beach, slob, shingle, sand, and rocks, and rock pools occur, and a rapid and strong current sets in round the island, so that there is no lack of fitting localities for every kind of Crustacea. My researches were confined to the littoral zones chiefly, and hence this list includes but few of the *Macroura* and *Anomoura*.

LIST OF SPECIES.

Hyas araneus, common, and a littoral species here. In Ireland it has occurred all round the coast, as follows:—Carrickfergus (W. T.), Dublin, Youghal, Valentia, Clew Bay (W. T.).

Hyas coarctatus, apparently rare. I saw but one specimen. This may arise, however, from its being a frequenter of deeper water than the last; such, at least, I find to be its habits in Dublin. This species has been selected by Dana as a type of his Caledonian group, and yet it is recorded as occurring on the shores of La Manches. In Ireland it has occurred at Giant's Causeway (O. C.), Belfast (W. T.), Dublin, Cork (J. V. T.), Valentia Island, Galway Bay, 1857. In Dublin Bay it is much commoner than the last, being less local, but preferring deeper water.

Maia squinado, common, and deep sea, or, at least, laminarian; taken in the lobster-pots; undoubtedly a southern species. Forbes makes it one of his South British types. Information with regard to the limits of its distribution is much wanted. It is recorded from Wexford (W. T.), Cork (J. V. T.), and the west coast, as far north as Roundstone Bay (W. M. C.).

Xantho florida, very common under stones between tide-marks. Two distinctly marked varieties occur, the one having the wrists quite smooth, the other with the wrists picked out into irregular, confluent, slightly raised ridges. This is probably only a variety of the smooth-wristed form, as intermediate forms are common. There is great variety in colour among the specimens, some being colourless, similar to the specimen recorded in Thompson from Lahinch, and which, through the kindness of Dr. Robert Ball, I have had an opportunity of examining.

The species appears to be southern and western in its distribution.

It has been recorded in the Dublin lists on the authority of Dr. Ball. I find the observations of this gentleman with regard to our Dublin species so correct,—in fact, in every instance but this having verified his observations by specimens obtained by myself,—that, although a careful search for this species in Dublin, on my own part, has been hitherto unsuccessful, I yet feel great hesitation in contradicting the statement. The fact of there being but a single specimen in his collection, so marked, leaves room, however, for the surmise that there may have been some mistake. In Ireland it has been recorded in Antrim (O. C.), Dublin Bay? (R. B.), *vide ante*, Hook Head (R. B.), Cork? (C. C. S.), Valentia Island, Tory Island (W. T.) The specimen thus marked in J. V. Thompson's collection is *X. tuberculata*.*

The fact of the species having occurred on the north-east coast does not militate against its being regarded as southern. Several other seemingly southern, or, more probably, western species, are found to occur along the eastern coast of the north of Ireland. In England, as far as I find it recorded, the distribution of this species is southern.

Xantho rivulosa.—Along with the last, a single specimen was found under the stones near Renaune Point: it is a female, and half grown, and exhibited the following distinctive characters, as contrasted with *Xantho florida*, captured at the same place:—Front produced, directed forwards, lamellar, *beaded along its margin*; pterygostomian regions *granulated* (in *X. florida*, punctated); dentition of lateral edge. D. slightly marked, yet distinct, E. N. T. S.; (in *X. florida* D. nearly completely obsolete); superior surface of carapace much flattened, posterior pairs of legs *hairy upon superior edges*. The character of the double groove on the movable finger is by no means a constant distinction, as it is found in some young specimens of *X. florida*.

This is undoubtedly a southern species. The only Irish specimen heretofore known, and which I am, through the kindness of G. V. Du Noyer, Esq., enabled to figure from the original sketch made in 1839, and which is itself here exhibited through the kindness of the authorities of the Museum of Irish Industry, was obtained at Portrush, 1839 (O. C.), Hook Head (R. B.),† Valentia Island, 1856, Galway (Prof. Melville).

* *Xantho tuberculata*.—Among the collection of Crustacea purchased from J. V. Thompson by the Royal College of Surgeons, Ireland, and by them presented to the Royal Dublin Society, there is a mutilated specimen—marked in the Catalogue No. 23, "*X. florida*, imperfect"—which is either this or some closely allied species. The absence of the hindlegs prevent a positive opinion as to the species; but in the produced front and coarsely tuberculated hands, &c., it appears identical with Bell's figure. I have noticed it here, as it appears to have escaped W. Thompson's observation; and it were exceedingly desirable if the occurrence of this south-British type on the Irish shores could be confirmed. It is singular that there is no specimen of *Xantho florida* at all in the collection. I have been at pains to identify this specimen as the actual specimen described in the Catalogue as above, and find there cannot be any doubt as to its identity.

† *X. rivulosa*.—Since the above paper was read, Dr. Robert Ball kindly afforded me an opportunity of examining the fine collection of Irish Xanthos in the University Museum, Trinity College, and among a number collected at Hook Head, county

Cancer pagurus.—Here, as all round Ireland, occurs abundantly, and appears to be universal—in fact, no district is without it.

Carcinus menas.—Also abundant, varying much in colour, especially the young specimens which at Valentia Island are generally of dark olives and grays. I did not meet any of the light-coloured varieties which are common in the Dublin rock-pools. The amount of arcuation of the front varies much in some of my specimens. This species appears as widely distributed as the last.

Portunus puber.—Very abundant, littoral and laminarian. The Valentia specimens are much more convex than Dublin coast specimens, which are, many of them, nearly quite flat. The young of this species, as well as those of the next two, might be easily confounded with those of *Carcinus menas*, the only difference at first sight being a *sparse pubescence*. The young specimens of this species are, many of them, most beautiful in their colours: patches of rose-pink adorning the branchial region, and a stripe of the same colour running down the median line. The frontal teeth in young specimens appear as pearly granulations only.

Distribution.—Bangor, Co. Down (O.C.), Dublin, Youghal, Valentia, Lahinch, Tory Island (W.T).

Portunus corrugatus.—Rare; small specimens occur in pools left in the sands and among *Zostera marina* at Ringlass Point. It appears to be generally distributed around Ireland, though there is no certain record of its having been found on the south coast. It is omitted in the Cork Cuvierian Society's list. J. V. Thompson's specimens, marked *P. corrugatus*, are uncorrectly named; as it occurs in the Mediterranean it may be a southern species, attaining its extreme limit in Dublin Bay, but, more probably, further research will establish it around Ireland. At present, the following comprises the districts in which it has been found:—Larne (O.C.), Dublin Bay (R.B.), and also my own collecting, Valentia Island, and the west coast generally, to Birterbie Bay (W.M.C.).

Portunus arcuatus.*—Specimens occurred in the same locality as the last; this species is a most interesting example of representative form, copying closely the outline of *Portunus integrifrons* of the Indian

of Wexford, by Doran, some years since, I had the pleasure of detecting a small specimen of this species—thus confirming its southern range. Although this collection includes some dozen specimens, which I carefully examined, I could not find another example of this species. These specimens, Dr. Ball informed me at the time, had never been critically examined before.

* *Portunus carcinoides* (Mihi).—Along with the above species three specimens of a *Portunus* occurred, which, though neighbouring to *P. corrugatus*, seem to belong to some other species. I have, therefore, ventured to describe it provisionally, under the name of *P. carcinoides* (from its resemblance to *Carcinus menas*), as follows:—

Carapace smooth, without raised ridges, regions marked out by rounded prominences only, sparsely hirsute. Front *three-lobed*, middle lobe largest, *edges of lobes entire*. Antero-lateral margin of carapace five-toothed. First pair of legs equal, surface nearly smooth, hirsute; two flattened, triangular teeth at anterior superior angles of wrist; hand with two well-marked carinae on the upper sides, *the inner terminating*

Ocean, and even the habitat,—which appears to be erroneously given in Bell as deep water,—at least in Valentia Island, I find *P. arcuatus* tolerably abundant under weed-covered stones, between tide-marks, precisely as *Portunus integrifrons* occurred to me in Port Philip Bay, Australia. The young specimens of this species are, probably, often passed over as *Carcinus menas*, from which it is often difficult to separate them. It is, most probably, a southern species, that is to say, one of Forbes's Atlantic types.

In Ireland it has been recorded as occurring as follows:—Strangford Lough (O. C.), Portmarnock, Co. Dublin (R. B.), Dublin Bay, 1852, Cork (J. V. T.), Valentia Island, Killeries (W. T.).

Portunus depurator occurs, but not common. This species has been erroneously supposed to be rare in Ireland, probably from its being generally an inhabitant of tolerably deep water: it is neither rare nor yet local, as the following list shows:—

Belfast (O. C.), Portmarnock, Dublin, Bray, Youghal (R. B.), Valentia, Dingle, (W. Andrews, Esq.), Roundstone (W. M'C.), Galway.

Portunus holsatus did not occur to me; specimens of it were shown me, and specimens from Dingle Bay, collected by Wm. Andrews, Esq., are before you. This species is undoubtedly more northerly in its tendency than the preceding; in Dublin Bay (where it is far the commonest species) a wrinkled variety, hardly to be distinguished from *P. depurator*, occurs especially in Dalkey Sound; it frequents sandy bottoms more than that species.

Distribution:—Belfast (W. T.), Dublin, Cork (J. V. T.), Dingle (W. A.), Roundstone (W. M'C.), Galway, 1857.

Portunus pusillus occurs rare; a generally diffused species; but seemingly rarest on the western shores. In Dublin Bay it occurs commonly in the extreme laminarian zones, as at Dalkey Sound, where, nearly in every haul of the dredge, specimens may be captured.

Co. Down (O. C.), Dublin, Cork (J. V. T.), Valentia, Roundstone (W. M'C.), Killeries (W. T.)

The only other *Portunus* taken in Ireland (*P. marmoreus*) was, as you have been already informed to-night, first captured by W. M'Calla, in Roundstone Bay.* Into its history there is no necessity to go further,

in a very minute, obtuse tubercle. Upper edges of second, third, and fourth pair of legs very sparsely hirsute; fourth joint broadly keeled above; fifth and sixth acutely keeled; sixth joint slender, styliform; terminal joint of posterior pair of legs narrowly lanceolate, with a raised central line, hairy on the edges.

The specimens obtained were all young. I have, therefore, preferred inserting the species in a note; but it is probable it has been passed over as either *P. arcuatus* or *P. corrugatus*. It might also be easily mistaken for young of *C. menas*. It occurred in the rock-pools and also under stones on Ringlass Point.

* The following are M'Calla's own words recording this discovery:—

“PORTUNUS MARMOREUS.

“A short time previous to leaving Connemara, I had the pleasure of finding a single individual of this species. This is the first instance of its occurrence as Irish. Habitat: a sandy beach, at extreme low water; locality, Island of Innislacken.”—*Saunders's News-Letter*, Jan. 9, 1845.

as it has already formed the subject of an interesting paper from its rediscoverer there, Dr. Farran. I will just state, that in Britain generally it has been recorded as having been found at Edinburgh, by Dr. Howden, there may be some mistake here, as *P. holsatus* does not occur in his list at all, and it is also included in a list of Moray Firth Crustacea, but *P. holsatus* is also omitted here, and all along the south coast of England; it has not occurred as yet on the south coast of Ireland; but I am sure, if sought, it will be found there too. It is a Mediterranean species, and very distinct from both *P. holsatus* and *P. depurator*. Galway, 1857.

Gonoplax angulatus.—A single specimen was shown me, obtained on the shore, near the quay, living, after a heavy gale. I sought it myself in vain.

This species is a most puzzling one in its distribution, and undoubtedly local where it does occur. It has occurred on the coast of Dublin, as specimens, in the possession of Dr. C. Farran and Dr. R. Ball, prove.

Distribution:—Bangor, Co. Down (O. C.), Dublin (R. B. and C. F.), Cork (J. V. T. and R. B.), Valentia Island, Roundstone (Prof. Melville).

It is possibly a southern species, following that peculiar line of distribution to which I have already alluded; that is to say, south, west, and north of Ireland, and, for a limited distance, down the north-east coast. However, further research may prove it be an inhabitant of the entire eastern coast. It is a Mediterranean species.

Pagurus streblonyx.—General in its distribution round Ireland, occurring north, south, east, and west.

Porcellana platycheles.—Exceedingly common under stones, the specimens varying much in colour.

Distribution:—Carrickfergus (W. T.), Portmarnock, Co. Dublin, Valentia Island, Kilkee, Tory Island (W. T.). A very local species on the eastern coast, though just as large as the northern specimens.

Porcellana longicornis.—Common in the deep rock-pools, among *Corallina officinalis*.

Distribution:—Strangford (O. C.), Dublin, Ardmore, Youghal, Valentia, Lahinch, &c. A very common and very generally distributed species.

Galathea squamifera.—Rare among the deep rock-pools of rather large size; one specimen only obtained; it appears to be generally distributed around Ireland. About Dublin, though small specimens are common in the lobster-pots and the dredge in the laminarian and coralline zones, adult specimens are seldom captured. It has occurred as follows:—Portrush (O. C.), Dublin, Youghal (R. B.), Valentia Island, Birterbie Bay (W. M. C.).

Palinurus vulgaris.—In lobster-pots. This is essentially a western species, but obeys the same law of distribution as *Portunus arcuatus*, *Xantho florida*, &c. It has occurred at Magilligan (O. C.), Youghal (R. B.), Valentia, and west coast generally. I can find no record of its having occurred on the eastern coast. Though fishermen have told me of its occurrence in Dublin Bay, I never succeeded in getting specimens of it.

Homarus vulgaris.—All around the coast. Calls for no particular remark.

Palæmon serratus.—Common on the zostera-covered banks, very large in size. The distribution of this genus is rather confused. A *Palæmon* under this name has been recorded as follows:—Portrush (O. C.), Dublin?? (W. T.), Youghal (R. B.), Valentia Island, Dingle (W. Andrews), South Isles of Arran (R. B.), Galway.

The fact most worthy of notice suggested by this list is the occurrence of species, undoubtedly southern or western in their tendencies, on the eastern coast. The most remarkable of these are *Xantho florida*, *Portunus corrugatus*, *P. arcuatus*; all common on the west, and either rare or local on the east, at least in Dublin Bay, where I have examined hundreds of localities similar to those in which these species occur plentifully on the west, and have only found one or two specimens. It would appear as though the tide of migration of these species northwards sent off a small stream southwards round the north-east coast of Ireland, which, probably, did not much extend beyond Dublin Bay, as these western species are much more numerous to the north of Howth than to the south of it. They will, probably, south of this point, if occurring at all, be found to be inhabitants of the deeper zones, while, as will be seen by reference to the lists above, on the western coast they occur as littoral species.

In the above list I have purposely abstained from mentioning many of the true western species, inhabitants mostly of the deeper water—such as *Acheus cranchii*, taken by Professor Melville, of Galway College; *Pisa tetradon*, by M'Calla, at Roundstone; *Thia polita*, by M'Calla, at Roundstone; and also in Galway Bay by Professor Melville, who at the time was ignorant of its previous occurrence on the British coasts, &c.; because this is not by any means intended for a perfect comparative list, but merely as a contribution to such a list. Had I drawn on the experience of others, the number of species could have been much augmented; but, for the reasons stated above, it appeared preferable to record my own observations only. In conclusion, I may observe, that of the most important species mentioned, specimens have been placed by myself and others in your Society's Museum, where they may be seen.

Mr. James R. Dombrain wished to notice the occurrence of the rose ouzel (*Pastor roseus*) at the Ball's-bridge Nursery, in the neighbourhood of this city, in the month of July last. He had much pleasure in presenting the specimen (which was the only one seen) to the collection of the Society. It is a bird of very rare occurrence in this country.

Mr. W. Andrews, Hon. Secretary, read a communication from the Right Hon. John Wynne, of Hazlewood, county of Sligo, recording the interesting discovery of the true maiden-hair (*Adiantum Capillus-Veneris*), in the valley of Glencar, county of Leitrim. This fern (one of extreme rarity in Ireland, records of its occurrence being hitherto confined to Tralee, Isles of Arran, Urrisbeg, and Co. Clare) was growing at a

considerable height, with a south-west exposure, in veins of shale which run through the limestone. It attained considerable luxuriance. This is the most northern locality known for the plant in Ireland.

The meeting then adjourned to the month of January, 1857.

After the ballot, the following were declared duly elected as Ordinary Members :—Arthur Mitchell, M. D. ; John Hamilton, Esq.

FRIDAY EVENING, JANUARY 23, 1857.

REV. SAMUEL HAUGHTON, F.T.C.D., M.R.I.A., in the Chair.

The Minutes of previous meeting were read and confirmed.

Mr. W. Andrews took the opportunity to correct a mistake which had crept into the report of a paper read by him at the meeting of the Society in June last, on the occurrence of the brown hairstreak (*Thecla betulae*) in Kerry. By some inadvertence he had been stated to have only observed one specimen, whereas, on the contrary, this insect was just as abundant in that locality as the brimstone butterfly (*Gonepteryx rhamni*). The hairstreak being considered a very rare insect in Ireland, he thought it advisable to correct this error.

MR. R. P. WILLIAMS then read a paper—

ON THE OCCURRENCE OF *COLIAS EDUSA* IN THE COUNTY OF WATERFORD.

I HAVE the pleasure of bringing before the notice of the Society, this evening, specimens of one of the rarest of Irish butterflies, which I have only seen recorded as such in the recent work of the Rev. F. O. Morris, on "British Butterflies," wherein he states that, on the 9th of September, 1844, two were seen, and one captured, by Mr. Joseph Poole, of Grovetown, near Wexford. A much earlier instance (the precise time of which I cannot supply, but certainly as early as 1820), however, occurred, when Mr. Tardy was forming his collection—afterwards increased by numerous additions, and classified by the late Dr. Thomas Coulter, Mr. Tardy having died ere he completed his task. This collection may now be seen in the Museum of Trinity College. Enthusiastic, however, as Mr. Tardy was, I believe he was not able to secure an Irish specimen, although two or three English, and marked as such, are in the collection.

A co-labourer in the field, the late Mr. Cooper Haffield, was more fortunate. He was, at least, blessed with a sight of the insect, though not doomed to be fortunate in capturing it. He is reported to have chased it for a distance of three miles, when it fairly baffled him by taking out to sea between Wicklow and Arklow Head. On return from his excursion, Mr. Haffield was so excited by the chase, and by the recollection of the insect vividly existing in his imagination, that, to record the fact, he at once set to work, and made a fac-simile of the butterfly he was not destined to capture. This he placed in his cabinet, and it has been passed over many a time by inquisitive eyes without detection, and duly acknowledged an Irish specimen. I had often heard that story very amusingly told, but with some degree of scepticism, until

I read the history of the butterfly, and learned that its haunts are the sea-shore, and its flight so rapid as to render its capture a matter of considerable difficulty. I think it a matter to be regretted that the derivation of names of genera is not generally explained in works of natural history. Not finding *Colias* explained, I have been guessing at its derivation, and as I find *Κολά* signifies a dance, I presume the name of the genus to be derived from that word, expressive of its mode of flight. *Colias*, I find also, was one of the names of Venus, from a promontory in Attica of that name, whence, possibly, the genus may have been named.

The specimens presented this evening were collected by one of our members, Mr. Richard B. Ussher, a young gentleman from whose zeal in the pursuit of natural history much good may be expected. He has already presented a large number of insects (which I hold in trust for the Society until proper cases shall be provided), besides other donations to the Society. These specimens were obtained in the autumn of 1855, and about the same time several other specimens were obtained by Mr. Samuel W. Tyndall, at Glanmire, county of Cork. This insect, though tolerably plentiful in England in some localities, is not to be counted on as being sure to be found, so much so, that many have considered its appearance triennial, quadriennial, and others septennial.

I shall proceed to read Mr. Ussher's account of the capture of the specimens presented by him. "In the autumn of 1855 I was staying at Ardmore, a place situated in the county of Waterford, between the towns of Dungarvan and Youghal; and being out walking one day round the cliffs, or rather in the fields above the cliffs, I was catching painted ladies (*C. cardui*), red admirals (*V. ammiralis*), and other butterflies, which occurred there in great abundance, when I observed a yellow butterfly which came flying up over the cliff; it flew very fast, and constantly alighted on the yellow flowers of the dandelion, which it closely resembled in colour, so that it could not be easily distinguished amongst them when it was not flying about. As I had never seen such a creature before, I pursued it, and easily captured it when it was feeding on a flower, but I could not catch it on the wing, it was such a strong flier; it proved to be a male of the species mentioned. After this I saw several others in the same locality; I suppose I saw twenty in that season altogether, but I never saw more than two in the same day: they always seemed to prefer dandelion or some other yellow flower. In the end of October I saw a male one day amongst the heath and furze on the side of a hill near Cappagh, about six miles from Dungarvan Bay, which is the nearest sea-coast. I succeeded in catching five of them that year at Ardmore—namely, three males and two females. I did not see any of them in the same locality this summer, as this was an unusually bad year for butterflies. I understand that others caught some near the same place, and at the same time as I did.—R. J. USSHER."

Dr. Kinahan observed that it was most gratifying to find that the country members of the Society were not altogether forgetful of its

meetings, and hoped that this paper was only the forerunner of many more, as interesting, from the same locality.

From his own experience of Ardmore, during 1852 and 1853, he had little doubt that this insect, in common with many others rare elsewhere, was to be met with during most years. When in that neighbourhood, in 1852, in company with a friend, the result of some of whose labours in natural history he himself had had the honour to record in the "Transactions" of the Society, but who was now, alas! no more—Edward Henry Sargent, Esq., he had met this butterfly in a narrow, sandy field, at Whiting Bay, next the sea. Mr. Sargent, who had collected the insect on the Continent, and was a keen lepidopterist, at once pointed it out as a rarity. Three or four specimens were seen on that occasion, but none were obtained, through want of a proper net.

On a subsequent occasion, Mr. Sargent captured several specimens, which Dr. Kinahan afterwards saw. It was to be hoped Mr. Usher would follow up his investigations into the Lepidoptera, not merely of Ardmore, but also of the lower valley of the Blackwater, where many rare things might be expected to occur.

Mr. Gilbert Sanders had met the insect in Devonshire. His first acquaintance with it was in 1844, on the glacis of Plymouth citadel, and had nearly eventuated in an introduction to a more unpleasant acquaintance—viz., a bayonet; as having, in the ardour of his pursuit, scaled the ditch, he was arrested by the sentry for trespassing on forbidden ground. This spot is facing the Sound, and, of course, near the sea. He had, however, also met the insect in immense numbers at a great distance inland—at Plymvalle, at the foot of Dartmoor mountain, on aquatic plants which fringed the "aits" here. They were here in such numbers that he was always sure of capturing them, and often saw a hundred specimens in an hour's walk. The capture in Ireland is curious, as occurring in a district in which the geological features resemble those of the districts in which he had captured it in England. Perhaps this arose from some peculiarity in the plants of the district.

MR. WILLIAM ANDREWS, Honorary Secretary, read a communication from LORD CLERMONT—

ON THE OCCURRENCE OF THE EARED GREBE.

"It may be interesting to the Society to know that either a female or young male of the eared grebe (*Podiceps auritus*) was shot on my estate at Blackrock, Dundalk, on the coast, on the 13th last December (1856): according to Thompson and Yarrell, it is of rare occurrence in any part of the British Isles. The bird is now in my possession."

Mr. Andrews said this was an interesting addition to many important and valuable communications of the kind already made by Lord Clermont to the Society. Mr. Andrews had also heard of the capture of the eared grebe, twelve months since, at Fethard, county of Wexford. This last notice had not been, however, confirmed.

Mr. James Haughton exhibited some curious webs woven by *Tinea granella* (?) over a quantity of Indian corn, and which, in the abundance of the web, and its greater toughness of texture, differed from that woven by similar, if not the same insect over heaps of wheat. The web exhibited was of two kinds—the one occurred as a comparatively unbroken sheet, of considerable size, of the consistency and thickness of Chinese paper, in colour varying from a whity-brown to nearly pure white, and of extreme toughness, though in parts no thicker than the finest gauze. These specimens, Mr. Haughton stated, were obtained from the side walls of the loft, to which they adhered, depending in long sheets, and giving the walls the appearance of having been papered with a whity-brown tissue paper, with a glistening surface. The ceilings, and other portions of the loft which had been plastered, were covered with a similar web, similarly adherent.

The other specimens were of a dirtier colour, more broken in texture, and covered over with cocoons of the moth. The sheets were mostly double, and were found spread like a cloth over the entire surface of a small loft of corn. The surface of the web was covered by myriads of the larvæ, crossing and recrossing in every direction. These larvæ, in many instances, had attached themselves to the web, and there, spinning their cocoons, entered into the pupa state, the surface-web forming the under side of the cocoon.

The rapidity with which the corn was covered was most remarkably seen whenever the heap was shifted or turned, a day or two sufficing to allow of a large surface being covered. Mr. Haughton thought it worth ascertaining (if possible) whether the nature of the food of the larvæ (Indian corn) had anything to say to the peculiarities of the web mentioned—viz., its great toughness and abundance.

The meeting then adjourned to the month of February.

FRIDAY EVENING, FEBRUARY 13, 1857.

SAMUEL GORDON, M. D., M. R. I. A., in the Chair.

THE Minutes of the previous meeting having been read and signed,—

Mr. W. Andrews, Honorary Secretary, read a communication from Richard Griffith, Esq., LL. D., presenting to the Society a coloured copy of his Geological Map of Ireland, and expressing his gratification at the progress of the Society, and on the enlargement of its sphere of scientific inquiry. Mr. Andrews said that it was very desirable that the Society should possess a copy of this useful Map, and that he felt much pleasure in moving a special vote of thanks to the donor for his exceedingly valuable present, which, having been duly seconded, was passed unanimously.

Mr. G. V. Du Noyer, in presenting to the Society, on the part of Major O'Connor, of Tralee, specimens of a fungus (*Polyporus*), stated that these specimens were found fourteen feet under a bog near Tralee, and were, in the first instance, mistaken by the peasantry for fossilized "horses' hoofs," which they closely imitated. They had still attached to them portions of oak-bark, and were evidently at one period of their exist-

ence attached to timber. He was not aware that any similar remains had been noticed, but thought records of such things might be of importance in helping to clear up some of the difficulties at present confusing the history of the growth of bogs.

Dr. Kinahan noticed a new species of Crangon, which he had lately discovered on the Dublin coast, and which he proposed to call *C. Allmanni*. The species is allied to *Crangon vulgaris*, the most prominent distinction being that the superior surface of the terminal segments of the abdomen in *C. Allmanni* are sulcated. Full details would be laid before the Society at the March meeting.

DR. CHARLES FARRAN read a paper

ON *AKERA BULLATA*.

It is more than probable that the question will be asked by some of the members of this Society, why I should occupy its time in bringing forward for discussion a mollusc so well known and so widely diffused as *Akera bullata*. In answer to this question I reply, that I hold it to be one of the pleasing duties imposed on each member to contribute his mite of information to the fund now accumulating in the Transactions of the Society, and which must ere long lead to a more accurate, if not perfect, knowledge of the natural history of our own country. It is by bringing forward a number of facts, and digesting and arranging them, alone, we can hope to solve the anomalies which perplex the student in his pursuit of this delightful science.

My last visit to Birterbie Bay has enabled me to bring before the Society, in the case of *Akera bullata*, a most extraordinary aberration from its normal condition, accompanied by a solution, which I trust will prove satisfactory, of the cause which produced it. At the December monthly meeting I had the honour of reading a paper, in which I detailed the discovery of the locality of the marbled swimming crab, *Portunus marmoreus*. I mentioned that the state of the weather was most unpropitious, although it was July. In fact, after making two or three hauls of the dredge, in which I captured that beautiful crustacean, we were compelled to leave that spot and seek for shelter in Birterbie Bay, and, carried on the top of a mountain wave, we ran down the bay until we opened on Roundstone, and, altering our course, we got under shelter of the highland of Innisnee, an island which, as I formerly explained to the Society, divides Roundstone Bay from Birterbie Bay. Having proceeded a considerable distance up this creek, we found water as still as a mill-pond although a storm was raging above us, and as our speed was slackened, I thought I might as well try the dredge, and accordingly threw it overboard, and had it under weigh for two or three hundred yards, when we found ourselves fixed between two ledges of rock, and imbedded in a sludge of mud and decayed or decomposed Nullipore.

Having ascertained that no damage was done to the vessel, my first care was to have the dredge brought on board, and my surprise was great when fifteen egg-like substances, and fully as large, rolled on

the deck; the resemblance to duck eggs, mottled with brown and purple spots, as if incubated for some time, was most striking. At first sight I took them for some undescribed species of *Doris*, but on keeping one of them in my hand I found that it gradually elongated and exposed the apex of the spire, but of such size that I entertained doubts as to its identity with *Akera*. The measurement of the largest when first taken was as follows,—three inches in length, and two and a half in diameter, and the weight, when we reached Roundstone, one and a half to two and a half ounces. When exposed for some short time they gradually contracted their mantles, became more flattened, and thus exposed their shell to some extent. In about an hour after their capture they began to throw out a considerable quantity of thick glairy mucus, exhaling a smell resembling iodine mixed with violets; after this they diminished considerably in size, and still further laid bare their shells, which I perceived were of gigantic size. When replaced in the water they never recovered their full size, but completely covered their shell with their mantle.

The men having extricated the vessel from her unpleasant position, I prevailed on them to make several tacks, in hopes of securing more specimens of this prize. This they did, but without success, having kept close to, but outside, the rock, the water shoaling and the tide receding, preventing us from keeping in our first course. Finding our efforts vain, and the wind lulling, we took the opportunity, and returned safely to Roundstone. Here I had fresh water supplied to the prisoners, and safely locked them up for the night. On giving the matter further consideration, I came to the conclusion that the *Akera* lived here in shallow water, for I had not more than two fathoms of rope when I first threw out the dredge. I reflected that whatever power the wind exercised, blowing as it did from the land, assisted by the receding of the tide, tended to drive the vessel from the shore; consequently, when we reached the rock, we were considerably outside the line where *Akera bullata* lived, and that we had but touched on them in a slanting or transverse direction, and yet, in that spot of contact had captured fifteen; and further, that tacking outside the rock, we were going into deeper water, and, consequently, further removed from their locality; and, as I observed before, the space between the rock and the shore had shoaled, so that it was impossible for a vessel of our size to go over it.

Having this conviction in my mind, the next day I procured a boat carrying a small lug-sail, and drawing less than eighteen inches of water, and steering to the ground, I had the satisfaction to find that my calculation was correct; for on dredging over the ground laid down in my mind's eye, within the rock, and closer to the shore, the tide being full in, I obtained as many of those magnificent specimens as I desired—thus corroborating the conclusion I had drawn of their inhabiting shallow water.

I shall now explain why I have been so particular in giving those details as to locality and depth. It was in this creek—I might say this very spot—where I obtained, in the year 1844, the rare Irish shell,

*Bulla hydati*s, and where, in the year 1854, I sought in vain for it, spending hours on hours in search of it, but failing; I had some vain hopes, when I threw out the dredge, I should again meet it; but the result proved I was wrong. In addition to all this, Mr. Barlee, who had investigated most critically Birterbie Bay, surprised at the size of some specimens which I had forwarded to him, expressed his astonishment how it had fallen to my lot to discover such a treasure, after his having ransacked every nook and corner of the bay.

I now exhibit specimens from the collection of my friend, T. W. Warren, Esq., from the locality of Baldoyle, county of Dublin; of course they represent the shell of its average size and appearance; one specimen from my own collection, from the same locality, designated by Mr. Barlee and the late Professor Forbes as a "monster specimen;" and specimens from Roundstone Bay, obtained exactly opposite the creek in Birterbie Bay, and, in a right line, not more than a quarter of a mile from it; and also, the giants themselves. I exhibited to every naturalist in Dublin, who wished to see them, those extraordinary shells. Whether this discovery excited in their minds any interest, it is not for me to determine; but I can safely assert that it was received by my friends elsewhere with something more than surprise.

I shall select from numerous communications the observations of two of the most accomplished conchologists in England—Mr. William Clark, of Bath, and Mr. Barlee, of Exmouth—to whom I had sent specimens, and those certainly not the very finest. Mr. Clark observes:—

"You have indeed favoured me with a most desirable addition to my collection. Mr. Barlee mentions in a letter that you had met with some Goliaths of the *Bulla* tribe; but my imagination failed to represent specimens of such gigantic proportions. The animal of the *Akera bullata* is of so delicate a texture, that the character of the external and general configuration escape correct observation from spirit specimens; these points can only be correctly observed by one who has the opportunity of seeing the animal contract and display itself immediately on its capture. The presence or absence of a gizzard, and others of the internal points, would admit of a closer examination. If again these creatures should come into your hands, notes bearing on these points would form a bright page in the annals of Natural History."

And in another communication Mr. Clark says he feels great pleasure in contemplating the colossal molluscan growth of some of the species of the Irish seas, which he apprehends results from the stimulus of their being exposed without interruption to the pure Atlantic wave.

Mr. Barlee writes to me thus:—

"Your take of the *Akera bullata* (which is fully three times as large as I ever saw it), so near, I presume, from your account of the spot you ran into for shelter, to the place where I took them the year before, is remarkable—that is, remarkable that I did not fall in with some of those monsters. I had two years' dredging all round that locality without taking the species at all, although about five miles up the bay, in rather shallow water. I once dredged several dozen of what I considered very

fine specimens, being larger than any I had taken from the many localities I had found them in. I suppose it would be in vain to account for the magnitude of your specimens—that is to say, whether it is from age or from some fine fattening ground they are in—because, the species being generally diffused over the bay, how is it, in the hundreds I have taken, that mine are not one-third the size of yours? In Roundstone Bay I also found them abundant, but of the average size of my other specimens. I find that every conchologist can boast of having some species far superior to those in the best collections; and you may rest satisfied that no cabinet can show finer *Pectunculus glycymeris*, *Akora bullata*, and *Kellia suborbicularis*, than your own. These three species I now remember, and there may be others you have that may vie with them."

You perceive Mr. Clark attributes the colossal growth of the molluscs to the stimulus of their being exposed without interruption to the pure Atlantic wave; Mr. Barlee, to age and the peculiar quality of the ground on which the animals were placed. That none of these agencies are sufficient to account for the monstrous growth of these specimens is shown by the fact, that the animal, when exposed without interruption to the Atlantic wave, never, at least so far as our investigation warrants us at present in saying, attain such a size; as is plainly seen in these specimens from Roundstone Bay, which is completely unprotected, or, in other words, exposed to the open sea in that spot whence the specimens were procured; and the inference drawn by Mr. Barlee, as to the fattening quality of the ground, cannot be maintained, inasmuch as the composition of the soil is identical in every creek in both bays, consisting of decayed or decomposed nullipore; and this being a very light substance, is wafted by the tide towards the shore, and forms the margin of all the inlets, and it is on this *Akora bullata* is to be found.

I am sure both these gentlemen will agree with me, that there is one essential condition, probably combined in a degree with each of their suggestions, which should be present to account for this great growth, and that is, perfect tranquillity, or freedom from disturbance; and this state is to be found in an eminent degree in the spot I obtained those specimens. You may recollect I mentioned that, on getting under the high land of Innisnee, we passed from the agitated waters of the bay into water as smooth as a mill-pond, although it was blowing a fearful gale overhead, the wind veering from west to south-west. On carefully examining the locality, I found it completely land-locked, sheltered on every side by high land; and it should be observed that the north and east winds, which on the easterly side of our island produce such a rolling and tumbling sea, on the west coast act in an opposite manner, stilling the water, and not even producing a ruffle on the surface: so that, no matter from what quarter the wind blows, here reigns perfect tranquillity, an essential ingredient in producing great animal development. Another physical fact is worth noticing—frost or snow, when they do occur, seldom last longer than twenty-four hours, and they require to be severe to continue so long; and so very mild in general is the weather on this

island, that fodder is never given in winter to the cattle placed on it, a perennial vegetation amply supplying their wants. I have endeavoured to give an account of this interesting occurrence as briefly as possible.

I should mention that the following morning, on examining the specimens I had placed in the bucket, I found them all dead, some of them being separated from their shells, and floating. My time was so pressing that I could make no anatomical examination of the others I obtained. Some of these I hurriedly put into spirits, but found to my regret, on my return to town, that they were in a state of decomposition. However, I trust at the beginning of our next session to lay, in accordance with Mr. Clark's wishes, a full detail of their structure before the Society, and conclude by stating that the measurement given by the best authorities of those shells, is generally from three-fourths to an inch in length, while those I have the pleasure of exhibiting to the Society are from two to two and a half, and, when recent, three inches in length.

The paper was illustrated by a coloured tracing of the position and bearings of Birterbie Bay, Connemara, and with numerous beautiful specimens of large size of *Akera bullata*.

An animated discussion took place on Dr. Farran's paper, in the course of which Dr. Farran stated that he had been unable to detect any trace of a gizzard in his specimens.

Mr. E. Percival Wright stated that if *Akera bullata* had not a gizzard, it could not be included among the Bullidæ; for he agreed with Mr. Clark, that the presence of this organ was an essential character of the family.

In specimens examined by him, taken near Donabate and at the mouth of the Boyne, a gizzard was always found, and he had little doubt but that future investigation would also detect it in the Roundstone ones. Mr. Wright promised to take an early opportunity of presenting the Society with a detailed account of the anatomy of this species.

Dr. W. Frazer, who had dissected the animal under discussion, could fully corroborate Mr. Wright's statement as to the presence of a gizzard in the Malahide specimens. The species there occurred on *Zostera marina*, yet he could not find any traces of the ravages of the animal on the growing plants; it was a point of great interest as to whether these animals were zoophagous or phytophagous.

Mr. Andrews observed that the magnificent specimens exhibited this evening by Dr. Farran were still further proofs of what was yet to be accomplished on the west coast of this country, and were worthy additions to the valuable records he had already made in the Society, of *Gastrochena pholadia*, *Pholas papyracea*, *Pectunculus glycimeris*, *Bulla hydatidis*, *Teredo norrágica*, and *Portunus marmoreus*. A range of valuable ground yet remained unexplored along the west coast from Blacksod Bay to Kenmare River, especially in the deep-water soundings. *Akera bullata* was very generally distributed around the coasts, and was the favourite food of fish, especially of the turbot. Many species of molluscs,

taken in shoal water and sheltered estuaries, were found of larger size than the same species taken elsewhere, and it might be supposed that the very sheltered position of the small bay described by Dr. Farran, and the soft nature of the ground, probably encouraged the larger growth of these specimens.

Professor Haughton wished to protest against an idea which seemed to prevail in reference to these western rarities, viz., that they owed their peculiarities of distribution, &c., to the influence of an exalted temperature, due to the Gulf-stream. Experiments conducted by the Meteorological Survey, under the Rev. Dr. Lloyd, had completely disproved the existence of any such exalted temperature, the temperature at Bunowen Harbour being found on experiment to be nearly the same as that of Dublin Bay.

Rev. Professor Haughton made some remarks on *Euomphalus* and *Pleurotomaria*, recording a new species of *Euomphalus* from Sheffield, Queen's County, which he proposed to call *E. reginæ*. This paper will appear in full as a monograph of the Irish species of *Euomphalus*, in the Society's "Proceedings" in June.

The Chairman read a notice of the capture of the Death's-head Moth (*Acherontia Atropos*) at Bandon, county of Cork, on the 6th of July, 1856, communicated through the kindness of Joseph Ball Greene, Esq. This specimen was captured in a loft, attention being drawn to it by its cry, which was described as resembling that of a rat or weasel. The species was stated to have occurred in the same neighbourhood on a previous occasion. The specimen which was exhibited was a very fine one.

After the ballot the following gentlemen were declared duly elected as Ordinary Members :—

Richard Boyle, Esq.; Vere Webb Macnally, Esq.

The meeting then adjourned till March.

EXTRA POPULAR MEETING, MARCH 2, 1857.

REV. PROFESSOR HAUGHTON, F. T. C. D., M. R. I. A., in the Chair.

Professor W. H. Harvey, President of the Society, gave an interesting and lucid address on "The Starfishes of Ireland, and their Relations:" entering into the connexions between their various groups, and illustrating his remarks by diagrams and dried specimens from the Society's collections, and by living examples from Dalkey Sound of the genera *Comatula*, *Ophiocoma*, *Ophiura*, *Uraster*, *Cribella*, *Solaster*, *Echinus*, &c. In the concluding part of his address he alluded to the relations between British and foreign genera, illustrating his remarks by specimens obtained by him in the Society, Fejee, and Australian Islands.

After a few remarks from the Chairman on the connexion between the living groups and those met with among the fossil beds of the Old Red Sandstone and elsewhere, the meeting separated.

FRIDAY EVENING, MARCH 13, 1857.

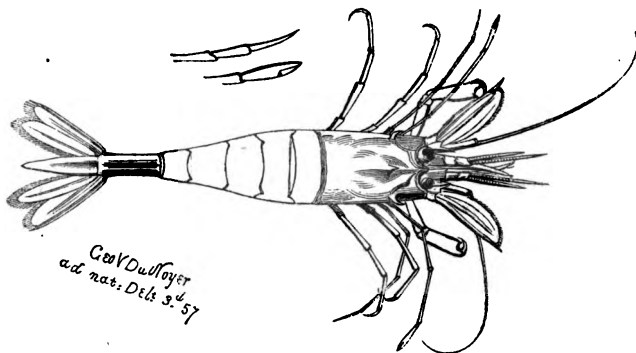
PROFESSOR W. H. HARVEY, M.D., M.R.I.A., in the Chair.

THE Minutes of the previous meeting having been read and signed,—

Mr. R. P. Williams exhibited a fine specimen of the Peregrine (*Falco peregrinus*), killed in the county of Meath, and presented to the Society by Henry Meredith, Esq., through George Annesley Pollock, Esq.

DR. J. R. KINAHAN read a paper—

ON A CRANGON NEW TO SCIENCE, WITH NOTICES OF OTHER NONDESCRIPT CRUSTACEA, AND OBSERVATIONS ON THE DISTRIBUTION OF THE CRUSTACEA PODOPTHALMIA OF THE EASTERN, OR DUBLIN MARINE, DISTRICT OF IRELAND.



BEFORE proceeding, according to my promise at our last meeting, to describe this hitherto unnoticed Crangon, it will be necessary to review, in a cursory way, the species of this genus already described.

The genus Crangon is now generally restricted to those macrourous Crustacea in which the first pair of legs are subcheliform, that is to say, terminating in a movable hooked claw, articulated to the external angle of the extremity of the terminal joint of the leg, and folding down on a permanent fixed spine, arising from the internal angle of the same joint; the second pair of legs slender, minute, and didactyle, i. e. terminating in a regular-formed hand, with a movable finger; the remaining pairs of legs acuminate and monodactyle; the external maxillipeds subpediform; the internal antennæ inserted on a line above the external, and the eyes free. Thus excluding certain species, which are now grouped under the following genera:—Argis (*Kroyer*). [Eyes concealed beneath the carapace; fourth and fifth pair of legs dilated, natorial: (*C. Lar.*) (*Owen*).] Sabinea (*Owen*). [Second pair of legs very short, not cheliform: *C. septem carinatus* (*Sabine*).] Paracrangon (*Dana*). [Second pair of legs obsolete: *Paracrangon echinatus* (*Dana*).]

The species referred to this genus are as follow :—

<i>Crangon vulgaris</i> (<i>Fabr.</i>).	<i>Crangon bispinosus</i> (<i>Hailstone</i>).
„ <i>fasciatus</i> (<i>Risso</i>).	„ <i>boreas</i> (<i>Phippa</i>).
„ <i>spinosus</i> (<i>Leach</i>).	„ <i>loricatus</i> (<i>Risso</i>).
„ <i>sculptus</i> (<i>Bell</i>).	„ <i>munitus</i> (<i>Dana</i>).
„ <i>trispinosus</i> (<i>Hailstone</i>).	„ <i>nanus</i> (<i>Kroyer</i>).

Of which the first six are recorded as Irish, the first five having occurred in the eastern or Dublin district; to these must be added the species to be now described—*C. Allmanni* (*mihi*).

Leach and Risso divided the species then known into three genera—*Crangon*, *Pontophilus*, and *Ægeon*; of these the two latter have been, by modern systematists, rejected as founded on insufficient characters, and, therefore, not natural groups. There appear to be good grounds for this opinion as regards *Ægeon*; but it is probable that further study of the homologies of those already known will lead to the re-establishment of Leach's genus, *Pontophilus*.

This genus was founded for those species in which the second pair of legs were much shorter than the first, the foot-jaws having their terminal joints long and slender, and the carapace covered with spinous lines. Of these characters the second is found to be inconstant; the first liable to confusion; but the third will, I am led to believe, be found constant, although in some species these spinous lines are reduced in number, and even replaced either by single spines, as in *C. trispinosus*, or rows of notches, as in *C. bispinosus*. This division includes *C. spinosus*, *C. loricatus*, *C. sculptus*, *C. nanus* (?), *C. trispinosus* (each row of spines reduced to a single spine, those of branchial regions obsolete), *C. bispinosus*, *C. munitus*.

In *Crangon* proper, the second pair of legs equal to the first and third; the foot-jaws have their terminal joints somewhat shortened, and we find one median spine on gastric region, and the lateral spines, when present, inserted on the branchial region. Under this section are arranged *C. vulgaris*, *C. fasciatus*, *C. boreas* (?), and the new species, *C. Allmanni*. For the present it is, probably, best to unite these two groups, as Bell and M. Edwards have done, into one group, under the name of *Crangon*.

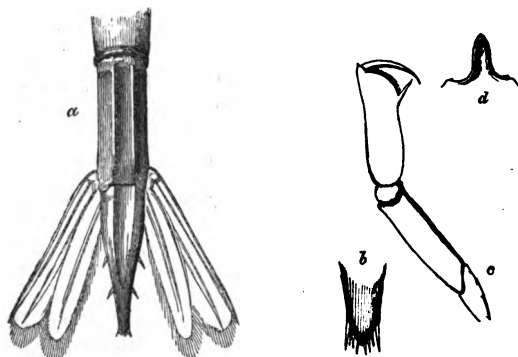
CRANGON ALLMANNI (*mihi*).

C. Crangone vulgaris affinis. Rostrum frontale brevius. Carapax lævis, spinis tribus armatus, una brevissima regione gastricâ medianâ, duæ regionibus branchialibus insitæ. Abdominis articulus sextus suprâ canaliculatus, ultimus supra-sulcatus, dentibus binis utrinque armatus, infra dentibus minutis prætextus. Pedum par primum subcheliforme, brachium læve et inerme. Maribus spinâ sternale brevissimâ, fæminis obsoletâ. Colore albus-cærulescens rufus et aureis punctis maculatus.

Habitat: "Zonam corallinam Maris Hibernici juxta 'Bray,' comitat: 'Wicklow.' Longit, uncie tres."

CHANNEL-TAILED SHRIMP.

SPEC. CHAR.—Carapace smooth, excepting a small spine on the median line of gastric region, and one on each branchial; second pair of legs as long as third; sixth segment of abdomen deeply channelled above; channel continued as shallow sulcus on terminal segment; third joint of anterior pair of legs perfectly smooth; a minute spine between insertion of second pair of legs in males; in the female spine, obsolete.



a, tail; b, middle plate of ditto; c, anterior leg; d, rostrum.

This species is closely allied to *Crangon vulgaris*. The carapace is large, rounded, depressed; the rostral projection comparatively longer and more acuminate; the foot-jaws, antennæ acute, and natatory plates of the tail as in *C. vulgaris*; the anterior pair of legs also similar, but wanting the spine which adorns the arm of that species; the spiny armature of the sternum differs strikingly. In *C. Allmanni* there is only one very short spine between insertion of second pair of legs in the male; in females this is altogether wanting. In *C. vulgaris* I find two spines present, one anterior and long, and the other posterior and minute. Middle lamina of the tail is more blunted, and armed with numerous teeth at the extremity, in addition to the four lateral teeth.

The colour is bluish gray, dotted over with brown, red, and gold; length of specimens, from 1·5 to 3 inches.

The channelled abdomen distinguishes it from *C. vulgaris*, *fasciatus*, and *nanus*. The absence of sculpture on the abdomen, and of spinous lines on the carapace, and the presence of the median spine, separate it from *C. spinosus*, *sculptus*, *loricatus*, *nanus*, *munitus*, and *bispinosus*, irrespective of other distinctive characters of less importance, as being more or less comparative. The external characters of the shrimps would enable us to separate them easily into various artificial groups, according to arrangement of the spines in carapace, smoothness of abdomen, shape of rostrum, &c.

The following analysis gives the external characters of the various species as far as known. The species in italics are not British.

[M. g. = median gastric region ; l. g. = lateral gastric ; br. = branchial.]

	Rostrum.	Spines on Carapace.	Segments of Abdomen.	Arm.
<i>Crangon vulgaris</i> (Fabr.) .	triangular, .	1 m. g., 2 br., . .	smooth,	spined.
" <i>Allmanni</i> (Kin.) .	triangular, .	1 m. g., 2 br., . .	6th bicarinated, . .	smooth.
" <i>fasciatus</i> (Ris.) .	truncate, .	1 m. g.,	7th channelled, . .	smooth.
" <i>nanus</i> (Kroyer) . .	rounded, .	2 m. g.,	smooth,	spined ?
" <i>boreas</i> (Phipps) . .	{ obtusely triangular.	{ 3 m. g.,	{ sculptured bicarinated,	{ ?
" <i>bispinosus</i> (Hailst.) .	triangular.	2 m. g.,	smooth,	smooth.
" <i>trispinosus</i> (Hailst.) .	truncate, .	1 m. g., 2 l. g., . .	{ obsoletely carinated,	smooth.
" <i>sculptus</i> (Bell) . .	{ emarginate truncate, .	{ 3 m. g., 16 l. g., 6 br.	3rd—5th sculptured; 6th, 7th bicarinated,	smooth.
" <i>spinosus</i> (Leach) .	{ truncately triangular,	{ 4 m. g., 8 l. g., 4 br.	3rd, 4th carinated; 6th, 7th channelled,	smooth.
" <i>loricatus</i> (Ris.) .	truncate, .	7? m. g., 14 l. g., 14 br.,	sculptured,	smooth ?
" <i>munius</i> (Dana) .	rounded, .	2 m. g., 2 l. g., 2 br.,	smooth,	smooth ?

The first specimens of this species were obtained by me, Dec. 7, 1856. from the fishermen's boats, along with the following other Crustacea:—*C. vulgaris* (?), *C. sculptus*, *Hippolyte varians*, *H. Thompsoni*, *H. Cranchii* (?), *Pagurus Hyndmanni*, *P. Cuanensis*, *Eurynome aspera*, and many zoophytes, inhabitants of the coralline zone. On a subsequent occasion, in February, I dredged the species in 30 fathoms of water, along with the following Echinodermes:—*Ophiocoma neglecta*, *rosula*, *bellis*, *granulata*; *Uraster glacialis*, in great abundance; *U. violacea*, *rubens*, rare; *Echinocyamus pusillus*, *Cucumaria Hyndmanni*. The specimen of *C. Allmanni* then obtained was in ova.

In characterizing this interesting new species, I have united to it the name of one of our Irish naturalists, whose labours in every branch of Irish zoology may be appreciated from the frequent occurrence of his name in the late William Thompson's "Notes on Irish Natural History," and by the monographs published by himself in the Annals and Transactions of many learned societies,—Professor George J. Allman, now of Edinburgh, late Professor of Botany in our own University, and the discoverer of *Polybius Henslowii* on Irish shores.

Along with the species recorded above were specimens in abundance of a *Pagurus* apparently specifically distinct from, though much resembling the immature specimens of *P. Bernhardus*, but differing in being in spawn much earlier in the year, and in its locality. This supposed species occurs all over Dublin Bay, in 20–40 fathoms of water, but is most common at Bray, where it is constantly brought ashore in the whelk-pots. It almost always is found inhabiting the shells of either *Natica nitida* or *Turritella communis*.

I hope before the close of your session to submit to your Society a

monograph of the Irish species of this genus, at present in preparation, and, therefore, will not now notice it further than as follows:—

PAGURUS EBLANENSIS (mih) (? BERNHARDUS).

Resembling young of *P. Bernhardus*. Hands more regularly globular, very granular; a raised denticulate line marking exterior edge; terminal extremities of posterior pairs of legs scarcely twisted; colour, reddish-white; legs prettily banded with reddish pink.

Among the Crustacea obtained at Dalkey Sound, I find specimens of a very remarkable form of Porcellana, exhibiting peculiarities hitherto undescribed, and which appear specific, the same form having occurred to me at Rush. It seems as well to notice it; and I propose, should it prove distinct, to call it *Porcellana priocheles (mih)* (πειρι χηλη).

SERRATE-CLAWED PORCELAIN CRAB.

Allied to *P. longicornis*. The anterior pairs of legs nearly equal; both hands furrowed, scabrous; exterior edges finely but distinctly serrated denticulate in arm, with ternal margin produced; broken up into lobes; front produced, finely denticulate, indistinctly four-lobed; sides of carapace armed with a number of teeth (?).

Colour: Pale-red, with blotches and patches of white.

Habitat: Rush; Dalkey Sound.

I have great doubt whether this is not merely a young form of *P. longicornis*.

In conclusion, I have to lay before your Society a list of species obtained on the Dublin coasts, additional to those noted by me in a paper on the "Crustacea of Valentia Island" (p. 62), as in that paper it only contains those noted by myself, with a single exception. Several more species have occurred. The references used are the same as in my previous paper, and I have omitted the species there noticed.

LIST OF SPECIES.

W. T., Thompson's Irish Fauna; J. V. T., J. V. Thompson's Collection; C. C. S., Catalogue of Cork Fauna; O. C., Ordnance Survey Collection; W. M' C., collected by Wm. M'Calla. The localities uninitialled are on my own authority.

Stenorrhynchus phalangium.—Common laminarian to coralline zones; sometimes thrown ashore; specimens dredged in deep water agree with the details of a form described by Wm. Thompson as a form of *St. tenuirostris*.

Belfast (W. T.), Dublin, Cove (J. V. T.), Dingle (W. Andrews, Esq.), Galway, Killeries (W. T.).

Inachus dorynchus.—Not uncommon; Malahide, Dalkey, same range as last.

Belfast (O. C.), Dublin, Galway, Roundstone (W. M' C.).

Inachus Dorsettensis.—Rarer than *I. dorynchus*.

Belfast (W. T.), Dublin Bay, Cove (C. C. S.), Roundstone (W. M' C.), Killeries (W. T.).

Eurynome aspera.—Rare; Bray, 25 fathoms.
Belfast (W. T.), Malahide (Dr. Lloyd), Cove (C. C. S.), Dingle (W. Andrews), Roundstone (W. M'C.).

Pilumnus hirtellus.—Rare; occasionally washed ashore. A fine specimen thus obtained on North Bull by V. W. Macnally, Esq., 1856; South Bull, 1857. Dalkey, rock-pools.

Carnlough, Antrim (O. C.), Dublin Bay, Youghal (W. T.), Courtmacsherry (Professor G. J. Allman), Lahinch (W. T.), Roundstone (W. M'C.).

Portumnus variegatus.—Merriion strand, common after easterly gales. Portrush (W. T.), Dublin Bay (omitted in southern lists), Roundstone (W. M'C.), Killala Bay (W. T.).

Pinnotheres pisum.—Common in Mytili and Modioli from deep water.

Belfast (W. T.), Dublin, Cove (J. V. T.), Galway (Prof. Melville).

Atelecyclus heterodon.—Rare. Merriion, under stones, 1854, young specimens.

Co. Donegal (O. C.), Portmarnock (R. B.), Dublin, Dingle (Wm. Andrews, Esq.).

Corystes Cassivelaunus.—Sandy beaches after gales; common.

Belfast (W. T.), Dublin, Cork (C. C. S.), Dingle Bay, 25 fathoms (W. Andrews, Esq.), Roundstone (W. M'C.).

The remainder of the species to be noted appear to have been neglected. Information regarding their distribution is much wanted.

Pagurus Bernhardus, var. *Eblanensis* (mihi); (? species).—Dalkey, 15-30 fathoms; Bray, 25 fathoms.

P. Prideauxii (?).—What appears to be this species occurs, though rarely, along with *P. Bernhardus*, in whelk-pots at Dalkey and Bray; also drift-weed, Merriion strand, in shells of *Buccinum undatum*, *Fusus propinquus* and *islandicus*, *Trochus magus*, &c.

Strangford Lough (W. T.), Dublin Bay.

P. Cuanensis.—Dalkey Sound, 10-15 fathoms, rare; Bray, 15-30 fathoms, much more common. Shells in which it occurs coated with *Halichondria suberea*?

Portaferry (W. T.), Cork, as *P. erinaceus** (J. V. T.), Dublin, Galway (Prof. Melville).

P. Hyndmanni.—Dalkey Sound, common; Bray, ditto; Merriion strand, very rare (W. V. Macnally, Esq.). Occurs generally in clean shells of *Trochus tumidus* and *Montagui* and *Nassa incrassata*. In spawn in February.

Portaferry (W. T.), Dublin Bay.

P. Thompsoni.—Same localities as last; much rarer. In spawn in March.

Belfast (W. T.), Dublin.

* The specimen thus marked is in the collection of the Royal Dublin Society. It is too much damaged to judge of its identity. W. Thompson pronounced it identical with the species described by him as above.

Galathea strigosa.—Dalkey, whelk-pots; rare.
Belfast (O. C.), Dublin Bay, Cork (J. V. T.), Giant's Causeway (W. T.).

G. nexa.—Merriion strand, 1854; a single specimen, Bray.

Antrim (W. T.), Dublin (Robert Ball); a most puzzling species.

Porcellana longicornis, var. *priochelae* (*mihi*) (? species).—Dalkey Sound; Rush.

Nephrops Norvegicus.—Dublin Bay.

Belfast (W. T.), Dublin Bay, Galway, Roundstone (W. M'C.).

Crangon vulgaris.—In pools; small in size. Merriion strand, Malahide, Bray. In spawn in February.

Belfast (W. T.), Dublin, Youghal (W. T.), Galway, 1857.

C. sculptus.—25 fathoms, Bray, rare.

Dublin, South Isle of Arran (Prof. Melville).

C. tripinosus.—Of this species, hitherto unnoticed as Irish, there are specimens among a number of minute Crustacea, obtained by Dr. Ball and Prof. E. Forbes, off the Skerries, in 5 fathoms of water, in 1845.

C. Almanni (*mihi*).—Bray, 25 fathoms. Spawns in February.

Hippolyte varians.—Dalkey Sound, Bray, Merriion strand, in drift-weed, rare.

Belfast (W. T.), Dublin, Cork (C. C. S.), west coast, 84 fathoms (W. Andrews, Esq.), Clew Bay (W. T.).

H. Cranchii.—With last, than which it appears more common; some specimens have the apex of the rostrum simple (? species).

Dublin, Cork (C. C. S. and J. V. T.), Galway (Prof. Melville).

H. Thompsoni.—Same localities as last; rare.

North-west coast (W. T.), Dublin.

Pandalus annulicornis.—Very common in rock-pools, and every depth to 30 fathoms.

Co. Down (W. T.), Dublin, Ardmore, Tiraght Rock, west coast, 84 fathoms (W. Andrews, Esq.), Galway, 1857, Killeries (W. T.).

Palæmon varians.—Apparently rare, but probably only unnoticed. Merriion strand, in sand-pools.

Belfast (W. T.), Dublin.

Mysis chameleon.—Merriion strand, on drift-weed, rare. Malahide, 5 fathoms; Dalkey.

Belfast (W. T.), Dublin, Cork (J. V. T.), West Coast (W. T.).

M. vulgaris.—Merriion strand, pools, abundant.

Belfast (W. T.), Dublin, Cork (J. V. T.), Lahinch (W. T.).

From this list it appears that the Crustacea are fully as well represented on the eastern as on the western shores. Want of sufficiently detailed observations prevent any more particular conclusions being drawn; but, though I have omitted one or two species, such as *Ebalia Pennantii* and *Cranchii*, *Crangon fasciatus*, *Palæmon Leachii*, &c., of which Dublin specimens are extant, the list is a fair average one of the district, and exhibits the remarkable absence of the South British and Southern types, and a great predominance of Celtic and European, just as might be ex-

pected from the position of Dublin, half-way between Ardglass Head and Carnsore Point, between which two points the true eastern marine district of Ireland lies, the great southern province prevailing below the latter point. The new Crangon most probably belongs to either the Celtic or British types, as otherwise the absence from British lists of this conspicuous species is not very creditable to the observative powers of our collectors.

Numerous examples of the several species described illustrated these remarks.

Rev. Professor Haughton corroborated from observation Dr. Kinahan's surmise with regard to Carnsore Point. The shells to the south are very distinct in their types, from those occurring even a very short distance north of this point.

DR. WILLIAM FRAZER next submitted the following, as the result of his investigations regarding the Fungi presented at the former meeting by G. V. Du Noyer, Esq., from Major O'Connor, and which he had been requested to examine and report on.

REMARKS UPON SPECIMENS OF FUNGI, OBTAINED ADHERING TO OLD TREES
UNDER A BOG NEAR TRALEE.

THESE specimens of fungi were, I understand, obtained adhering to oak timber which lay upon gravelly clay, and was covered by about thirteen feet of bog.

They are evidently specimens of "Polypori," a class of fungi characterized by the presence of innumerable "subrotund pores separated by their dissepiments, and having the hymenium concrete with the substance of the pileus;" and I have also no difficulty in referring them to the second subdivision of this class, namely, those furnished with minute, subrotund (not angular), pores. That they were "stemless and perennial," their numerous layers of growth, the results of successive seasons of development, amply demonstrated. Thus, out of forty-five species of Polyporus described in the Flora Britannica, I am restricted to about thirteen, to which only do these specimens present any analogy, and of these I have little difficulty in deciding that they most closely resemble *P. igniarius*, or the hard Amadou, of which I exhibit a specimen which had been growing for some years past on an old decaying plum tree, and although at first sight it appears to be very different in external form from the specimens from Tralee, I am pretty certain, at least, as to their close relationship. The difference between them in form is easily explained by the mode of attachment and development in both cases. The recent ones adhering to a great trunk, and creeping along its side in successive waves of growth; and the older ones closely resembling in shape a "horse-hoof," to which Mr. Berkely compares them, and which was probably due to their more erect growth on a fallen log of timber. The detection of undoubted remains of fungi in a semi-fossilized state is, I believe, extremely rare, and I am disposed to think that the fact is, as has been stated by Lindley, not to be so much attributed to their positive

infrequency in ages past, as to their peculiar structure, which, being altogether cellular, easily undergoes decay, their mushroom growth being followed by as rapid a decline, and their tissues in but few instances leaving the smallest trace behind by which they can be detected. It is, however, very different in the case of the higher Cryptogamia, which, having well-formed vascular structures, as woody fibre and scalariform vessels, are easily recognised by their fossil remains, minute fragments of the latter tissue especially affording sufficient evidence of their previous existence.

In the instance before us we have, from a fortunate combination of circumstances, specimens of fungi preserved in all their integrity through many ages—indeed, so perfectly, that they are almost as available for microscopic examination as if they grew but yesterday. The circumstances which appear to have conduced to this end were—first, their extremely hard texture, so unlike the majority of fungi, and which rivals that of many kinds of wood; their slow growth, and long persistent vitality, years being passed in their development; and, lastly, their having been buried in Irish bog, which is well known to have such remarkable powers of preserving objects of vegetable origin.

Microscopical sections of the fungi were exhibited.

After the ballot, the Chairman declared W. J. Sargent, Esq., duly elected an Ordinary Member.

The meeting then adjourned till the month of April.

DONATIONS TO MUSEUM.

DECEMBER 12, 1856.

James R. Dombrain, Esq.—*Pastor roseus*, shot at Ball's Bridge.

JANUARY 23, 1857.

William Andrews, Esq.—*Fuligula marila*, breeding plumage, Co. Kerry; *Pirimela denticulata*, *Ebalia Cranchii*, *Ebalia Bryerii*, *Atelecyclus heterodon*, *Maia squinado*, *Portunus arcuatus*, *P. puber*, *P. depurator*, *P. holsatus*, from Dingle; and some molluscs and birds' eggs.

Charles Farran, M.D.—*Portunus marmoreus* (male and female), Roundstone.

Richard Ussher, Esq.—*Colias Aedusa* (male and female), from Ardmore, Co. Waterford.

FEBRUARY 13, 1857.

Major O'Connor, Tralee, per G. V. Du Noyer, Esq.—Specimens of *Polyporus* semi-fossilized.

Vere Webb Macnally, Esq.—*Portunus holsatus* (wrinkled variety), Dalkey Sound.

John Robert Kinahan, M.B.—*Vespertilio pipistrellus*, Dublin; *Xantho rivulosa*, *Xantho florida* (variety), Valentia Island; *Inachus dorynchus*, *Portunus pusillus*, *Pinnothores pisum*, *Pagurus streblonyx*,

Pagurus Cuanensis, *P. Hyndmanni*, *P. Thompsonii*, *Crangon vulgaris*, *C. sculptus*, *C. Allmanni* (new species), *Hippolyte varians*, *H. Cranchii*, *H. Thompsoni*, *Mysis chameleon*, from the Dublin coasts.

Mrs. I. Townsend, Rossbegh, per Dr. Kinahan.—*Psammobia vespertina*, from Lough Ine, Co. Cork.

H. Meredith, Esq., per G. A. Pollock, Esq.—*Falco peregrinus*, Co. Meath.

TO THE LIBRARY.

"Natural History Review," for July and October, 1856. From the Editors.

"Transactions of the Natural History and Philosophical Society of Liverpool." Vol. X. From the Society.

"On the Prevention of the Smoke Nuisance." A Prize Essay. By C. W. Williams, Esq. From the Author.

"Geological Map of Ireland, geologically coloured, according to the latest observations." From Richard Griffith, Esq., LL. D.

FRIDAY, APRIL 3, 1857,

PROFESSOR W. H. HARVEY, M.D., M.R.I.A., F.L.S., President,
in the Chair.

THE Minutes of the previous Meeting having been read and signed,—

THE PRESIDENT rose, and made the following remarks—

WE had been summoned to meet to-night, a week in advance of our usual time, in consequence of the second Friday of the month falling on Good Friday; but instead of proceeding with the essays of the evening it becomes my unexpected and painful duty—in compliance with the unanimous wish of your Council—to move that this meeting adjourn to Friday, the 17th instant. The cause need scarcely be stated, so general throughout Dublin has been the shock felt at the sudden decease of Dr. Robert Ball, Director of the University Museum, and President of a Society kindred to our own. Of my private feelings on this occasion I will not speak. Every one knows how intimately we have been connected together for a very long time. Our friendship commenced two and thirty years ago, when I was a schoolboy, and closes, leaving me a gray-haired man; and throughout the whole of that period we have had neither quarrel, nor jealousy, nor severance of feeling any kind. I always found him the same—full of zoological information, most ready to impart it, and taking special pleasure in seeing other students of nature entering the field which he had so well trodden. I well remember how proud I was, as a boy, to find myself on terms of intimacy with a grown man who was so fully informed on the subjects which were mysteries to me. My favourite pursuit at that time was the Mollusca (I had not then commenced Botany), and during a summer spent at Youghal I profited largely from Dr. Ball's experience of the localities, and intimate knowledge of the habits of the animals we were seeking for.

It is not in Dublin that I need speak of Dr. Ball's subsequent career. There is no scientific body in this city with which he was not more or less connected or identified; and the high position to which he had just been named, as President to Section D in the coming Meeting of the British Association, shows the esteem in which he was held by those best competent to form an estimate of his character. It is said you may know a man's character by his friends. Who were Robert Ball's most intimate friends in his own particular branch of study? Forbes, Thompson, Yarrell, Owen, Bell, Johnston, Allman, Patterson—names well known to you all, and some of them of world-wide celebrity; and I might add to these almost every zoologist of note in this country, and England, and many of the brightest ornaments of zoological science in the continents of Europe and America. How the blank which has been left by his death can be filled up, I know not. He has fallen in the very prime of his age, and in the full career of his usefulness, and there is no one equally qualified as he was to fill the many duties to which his time was devoted. As Secretary of the Royal Zoological Society in particular, his loss will be keenly felt, for it is not too much to say that it was by his exertions mainly—I may almost say wholly—that the Zoological Society was kept alive during the long period of national distress, and to him, in a great measure, is to be attributed its present prosperous condition. It was his favourite care—for he saw in it a great popular instructor—an engine for diffusing a knowledge of animals, their forms and habits, among the masses of the people. That it has largely answered this purpose, so far as the very limited funds at its disposal have allowed, will readily be granted; and those who have sat long on its Council will agree with me that without Dr. Ball's constant and unremitting oversight, that end could not have been attained. His ingenuity was great; he was constantly devising ingenious contrivances for insuring either the comfort or the better exhibition of the animals under his care; and in the aëration and general management of the fish-tanks—the latest attraction of the Garden—he made many improvements.

But it would be endless to speak of the many ways in which he made his talents useful on every subject that engaged his attention—whether it were devising tanks, dredges, and nets for the zoologist; fern-cases for the botanist; rapid diagram paintings for the lecturer; or in arrangements for facilitating the dispatch of the official business in which he was so much engaged. I would rather dwell for a moment on that feature of his character which attracted and fixed the friendship of so many distinguished men, I mean his perfect openness and truthfulness, and the pleasure he took in imparting to any sincere inquirer whatever information was in his power on subjects connected with his favourite science.

He has not published much, but he has communicated much valuable and original information to others, by whom it has been made public. It is only necessary to turn to the works of Yarrell on Birds and Fishes, of Bell on Quadrapeds and Crustacea, of Forbes on the Starfishes and Mollusca, not to speak of Thompson's "Natural History of Ireland," to

see that Robert Ball's researches in British Zoology very largely enriched those works with materials. Besides work in the field, he had read much on his favourite science. His zoological library was large, and he was well acquainted with the contents of his books, which were equally at the service of his friends and fellow-students as were the resources of his own mind. In a word, he lived for others more than for himself. Had he been as studious of fame as he was anxious to diffuse knowledge, his name might have been more widely known to those who were personally strangers to him; but he could not have been more beloved or more worthy of our love. I speak not of the esteem in which he was held by the public; the unsolicited cortege that followed his remains to the grave renders such eulogy needless.

It was moved by W. ANDREWS, Esq., seconded by Dr. KINAHAN, and unanimously resolved—

“That this Meeting fully concurring in these statements, the President be requested to allow the Address just read to be inserted on the Minutes, and published in the Transactions of the Society.”

The question of adjournment having been put, was carried unanimously, and the Meeting adjourned to the 17th of April.

ADJOURNED MEETING, APRIL 17, 1857.

PROFESSOR W. H. HARVEY, M.D., M.R.I.A., F.L.S., President,
in the Chair.

The Minutes having been read and signed,—

DR. WILLIAM FRAZER read the following—

ON A DISEASE IN HYACINTH ROOTS, CAUSED BY CRYPTOGAMIC GROWTHS.

Few subjects are more difficult to follow satisfactorily than the development of the minuter forms of cryptogamic plants, and few, therefore, are enveloped in greater obscurity; unlike the sea-weed or the fern, which, from their gracefulness and beauty, at once attract our attention, the subject of my present remarks are by many considered to be peculiarly repulsive, and are associated in the mind with ideas of disease and decay; and although I must in fairness claim for some of them as full a share of beauty in external form as has, perhaps, been granted to any class of plants, still I cannot deny their frequent connexion with putrescent changes.

The exact nature of this connexion has been made the subject of many inquiries. Some have altogether denied that there was any real sequence between the development of these fungi and the disintegration of the organized tissues upon which they are found, considering their presence merely accidental, or at best of secondary importance, perhaps even useful in consuming the decaying particles; whilst others have attributed the changes which ensue in the rotting mass exclusively to their agency.

Much of the writings on this subject can be of little or no value, being mere theoretic ideas, without sufficient facts to warrant their reception; still, after laying these aside, we have a number of positive observations to aid us in determining the truth of those extreme opinions, and, as in many other matters, it appears to lie midway between both. To the microscope we owe much of what has already been accomplished in the investigation of these interesting growths and the study of their development, and amongst other remarkable advances in our knowledge we have ascertained by its agency that those lower forms of vegetable life, unlike the higher plants, may have, instead of a single kind of fructification, two, three, four, or even five different modes of reproduction; and also that, in place of a uniform manner of developing their structure, they may assume various states under different conditions, so unlike each other that nothing but the most ample evidence would enable us to connect them.

To illustrate my meaning I would merely mention the common and worthless blue mould, *Penicillium glaucum*, which is considered by our best observers to constitute in another form the well-known yeast plant, or barm, *Torula cerevisia*, so important in the process of fermentation and in making bread; and in still another state it develops into the thick-matted masses of the so-named vinegar plant, which has attracted so much attention in the last few years.

To prepare for the statements I am about briefly making as to a very common mould producing a diseased state of the hyacinth roots, I may remind you that the silkworm dies of a similar disease (the muscardine, and from a similar cause) a botrytis spreading its mycelium throughout its body, and when it reaches the surface, then alone developing its perfect fruit, by which time, however, the caterpillar is either dead or its tissues wasted by its parasitic enemy, and its vitality almost gone. The following, too, is the opinion of the Rev. Mr. Berkeley, who holds, perhaps, the foremost rank amongst British authorities on these pests of vegetation, as to the cause of our disastrous potato rot, in his recently published work on Cryptogamic Botany:—"Unwilling as the scientific world has been to allow the agency of fungi in the potato murrain, as regards that, as well as the grape mildew, there are few dissentient voices now amongst those who understand the subject. The mycelium flourishes in the large intercellular spaces of the leaves, but penetrates also into stem and tubers, and at length makes its way either to the external surface or some free cavity, where it fructifies. In a damp warm day the progress of the disease may be watched with ease, and the parasite (*Botrytis infestans*) may be seen spreading rapidly in a circle, converting all in its way into a mass of decay." He admits, however, that other fungi contribute to the same end.

I shall now very briefly detail my own observations. I had last year some remarkably fine hyacinths growing; they had formed their leaves well and were commencing to bloom, when, after a time, I noticed that the expansion of the flowers had been completely checked;

they dried up, and, becoming withered, my hopes of having flowers were thus ended. On examining the roots of the plants, I found them to be diseased; they had a very offensive odour, had assumed a pale-brown colour, and those which were farthest advanced in decay contained numerous bubbles of fetid gas, which I may state was not sulphuretted hydrogen. The decay appeared to me usually to commence from below, and to spread upwards in the roots, the epidermis still remaining firm after the interior was decayed. The microscope showed that the cells of the plant were separated from each other by lines of small dark dots which formed continuous chains; when these dots first appeared, the cells were healthy-looking, then became darker coloured, their contents broken up, and finally the cells themselves seemed to become isolated and detached, and to soften down.

Placed in fluid and carefully watched, I saw a small tuft of vegetation gradually arise from the side of some of the root, and after a few days its fibres crept beyond the fluid and developed into an *Aspergillus* (probably *A. candidus*). I may state that, on examining them, I found moulds developed on the hyacinth bulbs; I believe it is very common for them to be injured from this cause, the mould acting as a canker, and the part requiring removal with a knife. I had purposed repeating my investigations this spring, but was unable to do so from other occupations. I would, in conclusion, merely remind you that this plant, or its close relative (*A. glaucus*), is the mould the presence of which is so highly prized in cheese that it is, I believe, often inoculated with it to produce an article fit for the epicure.

A series of microscopic drawings illustrated these remarks.

The President remarked that many other fungi, during the progress of their development, take on most dissimilar forms. Old botanists, hence, have often referred to distinct genera forms which have now been proved to be specifically identical. One genus, for instance, *Sclerotium*, of which some twenty or thirty species have been described, is found to be really made up of the young states of the genera *Agaricus* and *Peziza*, so that *Sclerotium* is now nearly blotted out from our lists. Among the drawings exhibited to-night we see that a plant which we would be led to call *Leptomitium*, when traced to its full development, turns out to be *Aspergillus*. When in North America he was shown a number of so-called species of this false genus, at that time placed among the sea-weeds, which had developed themselves among the sulphate of copper solutions used in the electrotyping processes of the United States Survey. The plant had caused much annoyance and damage to the service, decomposing the solution, and throwing down the copper to such an extent as to render it nearly impossible to carry on the various processes required. He hoped Dr. Frazer would follow up this subject; the Irish fungi were nearly unknown, and a fine field was open for any one who would pursue the subject of the metamorphoses of these interesting plants.

The following communication was next read by DR. KINAHAN, Hon. Secretary :—

CARCINOLOGICAL NOTES: BEING A LIST OF THE CRUSTACEA PODOPHTHALMIA OF GALWAY MARINE DISTRICTS, CHIEFLY MADE DURING THE SUMMER OF 1850. BY A. G. MELVILLE, M.D., M.R.I.A., PROFESSOR OF NATURAL HISTORY, QUEEN'S COLLEGE, GALWAY, ETC.

THE district in which the subjoined species were captured extends from Loop Head to Slyne Head; including the bays of Galway, Roundstone, and Birterbie, and the channels and seas adjacent to the isles of Arran; many of the species from this latter locality were dredged from a depth of sixty fathoms. To the species of but local occurrence the name of the precise locality is appended; with but very few exceptions, the specimens were obtained in 1850, and specimens of most of the species are to be seen in the Museum of the Queen's College, Galway.

LIST OF SPECIES.

- Stenorrhynchus phalangium*.—Very common.
Acheus Cranchii.—A single specimen was obtained at Antrim, 1850; the only previous record of it as Irish was a specimen formerly in the collection of J. V. Thompson, but for some years past lost.
Inachus Dorsettensis.—Common.
Inachus dorynchus.—Common.
Pisa tetraodon.—Roundstone.
Hyas araneus.—Very common, littoral.
Hyas coarctatus.—Common, a deep-sea species, occurs from ten fathoms downwards.
Maia squinado.—Very common, deep sea.
Eurynome aspera.—Common in suitable localities.
Xantho florida.—Very common; the unicoloured variety just as common as that with black-tipped claws.
Xantho rivulosa.—Rare, two specimens only have occurred among dozens of *X. florida*, Galway Bay.
Cancer pagurus.—Common, but does not attain anything like the same dimensions here as on the eastern coasts, and is also much inferior as an article of food.
Pilumnus hirtellus.—Common.
Pirimela denticulata.—Rare. Roundstone.
Carcinus menas.—Common.
Portunus variegatus.—Carapaces of this species occur, rarely, in Galway Bay;—I have not succeeded in finding the animal itself.
Portunus puber.—Common.
P. corrugatus.—Common.
P. arcuatus.—Very common.
P. depurator.—Very common.
P. marmoreus.—Roundstone, 1850.
P. pusillus.—Common.
Pinnotheres pisum.—Very common in *Mytili* and *Cardium edule*.

Gonoplax angulatus.—Rare. Roundstone, 1850.

Ebalia Pennantii.—Common.

E. Bryerii.—Common.

E. Cranchii.—Common.

Atelecyclus heterodon.—Common.

Corystes Cassivelaunus.—Common.

Thia polita.—Galway Bay, by digging; of this interesting species I have obtained specimens each year since my first discovery of it here in 1850; three were obtained in March last (1857), two of which are at present alive with me. It is exceedingly local.

Pagurus Bernhardus.—Very common.

P. Cuanensis.—Common.

P. Ulidianus.—Common.

P. Hyndmanni.—Common.

P. levis.—Common.

P. Forbesii.—Rare. This species was obtained in 60 fathoms water off the south isle of Arran, its first record on the Irish shores.

Porcellana platycheles.—Very common.

P. longicornis.—Very common.

Galathea squamifera.—Rare.

G. strigosa.—Rare.

Munida Rondeletii.—Galway, rare.

Palinurus vulgaris.—My experience of the occurrence of this species would lead me to believe it rare here.

Astacus fluviatilis.—Rivers, common.

Homarus vulgaris.—Very common.

Nephrops Norvegicus.—Rare.

Crangon vulgaris.—Common, local.

C. fasciatus.—Isle of Arran, rare.

C. spinosus.—Isle of Arran, rare.

C. sculptus.—Isle of Arran, rare.

C. bispinosus.—Arran. This species, now first added to the Irish list, and of extreme rarity in Britain, was established by Hailstone on the authority of a single specimen; several specimens occurred to me, and there can be no doubt of its specific distinction from *C. trispinosus*.

Alpheus ruber.—Isle of Arran, 60 fathoms. This species is now first added to the Irish list; the specimen is particularly interesting as having been obtained in dredging. British specimens heretofore recorded were all obtained from the stomachs of fishes.

Nika edulis.—Roundstone, rare.

Athanas nitescens.—Ballyvaughan, county of Clare. Under stones between tide-marks; common, but local.

Hippolyte varians.—Rare.

H. Cranchii.—Common.

H. Mitchelli.—Rare; its first record as Irish; this specimen was obtained by me in 1850, and then laid aside as nondescript; it has since been described from Weymouth under the above name by W. Thompson.

Palæmon serratus.—Very common.

P. squilla.—Very common.

P. Leachii.—Common in autumn.

Mysis vulgaris.—Common.

Besides these, numerous specimens of the genera *Alauna*, *Bodotria*, and *Cuma* have been met with. These genera, or at least *Bodotria*, are synonymous with *Scorpionura* of J. Vaughan Thompson, as may be seen by examination of the specimens under that name in his collection in the Royal Dublin Society's Museum.

PROFESSOR KINAHAN next submitted the following—

NOTES ON THE FOREGOING PAPER, WITH A SUPPLEMENT TO HIS LIST OF
DUBLIN CRUSTACEA.

THE interesting paper just read contains several species not included in either of the papers on this subject which I have had the honour to submit to your Society during the present session. In order that our Transactions for this year may contain all that is known of the distribution of this family of Crustacea in Ireland, I have supplied the distribution of these species, taking the opportunity of adding, at the same time, a supplement of those eastern species (some of them of extreme interest, and one of *H. pusiola*, not previously here recorded), which have occurred to me since.

Although such a large number of Crustacea (sixty-three out of eighty-seven species) are recorded in this paper, yet, during a day's dredging in Galway Bay on the 27th of March last, when in company with Professor Melville, among twenty-two species which rewarded our labours, three occurred which had not been previously met with there by him, viz., *Portunus holsatus*, and *Pandalus annulicornis*, and a young specimen of *Portunus marmoreus*, a species hitherto unrecorded save in Birrterbie Bay.

DISTRIBUTION OF SPECIES NOT INCLUDED IN DUBLIN LISTS.

References as in former paper—A. G. M., Professor Melville.

Achaus Cranchii.—The only Irish specimen on record, formerly in J. V. Thompson's collection, was lost previous to the transfer of that collection to the Royal Dublin Society.

Pisa tetraodon.—First discovered by W. M'Calla.

"I am the only person who as yet has found this species in Ireland; its habitat is within two miles of Roundstone, in a pool at about half tide-mark. As particular situations are distinguished by algae growing in the pools, it may, therefore, be well to state the plants in that under consideration:—*Gelidium corneum*, *Polys. fruticosa*, and *Cystos. ericoides*. Owing to changes in the pools, I have not lately obtained this species; I have not found it in lobster-pots, and rarely under stones."—*Saunders' News-Letter*, January 9, 1845.

Xantho rivulosa.—I find I was in error in stating this crab had not occurred to M'Calla. At least, a card has lately turned up in the Royal Dublin Society's collection, labelled "*Xantho florida*, Roundstone," which was most probably part of the collection purchased from M'Calla; on this, undistinguished by any mark from numerous specimens of *X. florida*, is a fine male specimen of *X. rivulosa*, which must have escaped M'Calla's notice. It would then appear to be generally distributed along the south and western coast.

Hook Head (R.B.)—Valentia Island, Galway Bay (A.G.M.), Roundstone Bay (W.M'C.), Portrush (O.C.)

Portunus marmoreus.—Galway, Roundstone (W.M'C.)

Ebalia Bryerii.—Belfast (O.C.), Galway (A.G.M.), Roundstone (W.M'C.)

Ebalia Cranohii.—Belfast (O.C.), Portmarnock, Co. Dublin, q. v. (R. Ball), Roundstone Bay (W.T.)

Thia polita.

I had the pleasure of seeing this crab dug out of its sandy home, Professor Melville having kindly accompanied me to the station where, in 1850, he first met the species,—a fine female specimen, that now before your Society, was the only one met with. It bore the journey to Dublin in a small tin box packed in wet sand remarkably well, and has since been kept in a small vivarium.*

This crab has given rise to some discussion as to whom the priority of its discovery in Ireland is due. Having been lately looking over the back Transactions of this and other Societies, I find myself in a position to clear up much of the mystery of this "knotty" point. I hope, therefore, it will not be considered to be trifling with the time of the Society if I lay before them the results of these investigations.

Thia polita was first detected by that indefatigable collector, W. M'Calla, in Roundstone, in 1845; he failed in identifying it, as the following extract from a paper read by Dr. Charles Farran before your Society, January, 1845, proves:—

"This winter I have added two species, *Portunus marmoreus*, I have not been able to determine the genus of the other: one thing is certain, it is new to Britain, if not to science. The undetermined species was found in shallow water, at extreme low water-mark; I obtained five specimens. Having paid considerable attention to the Crustacea, I had no hesitation in writing to Dr. Scouler that I had been so fortunate as to have added a new genus to this department."—*Saunders' Newsletter*, January 9, 1845. (*Vide* also Report of Dublin Natural History Society for 1844-45, p. 17.)

The species was subsequently identified, and published by Professor Scouler, in a paper laid before this Society in January, 1846, as the following shows:—"Dr. Scouler then brought forward the dis-

* Still alive and healthy, although now three months in confinement—June 28, 1867.

covery of, and addition to, the British Crustacea of *Thia polita*. This remarkable and beautiful little crab was found near Roundstone, Connemara, by Mr. M'Calla, where it burrows in sand; only one species of the genus is described as European, and this discovery is an important addition to the Crustacea of Britain. A very fine female specimen was exhibited from the Museum of the Society; a smaller one, a male, is in the collection of the Dublin Society."—*Saunders' Newsletter*, January 9, 1846. *Vide* also Eighth Report of Dublin Natural History Society, page 8.

M'Calla himself also brought the discovery before one of the Evening Meetings of the Royal Dublin Society, held 28th of February, 1846. (*Vide* Proceedings, Royal Dublin Society, vol. lxxxiii., Appendix xv., p. cxi.ii.; and vol. lxxxii., Appendix v., p. xlv.) This last paper purports to have been read on the 10th of January, 1846, but must have been corrected subsequent to this date. Professor Scouler, furthermore, presented specimens to the British Museum, as appears by reference to their Catalogue published in 1847.

By some mischance or other, however, it escaped the notice of English naturalists, and when in 1850 Professor Melville, ignorant of its previous occurrence on our shores, met with the species in Galway, he, having first identified it from the description given by Milne Edwards, forwarded specimens to Professor Bell, by whom it was published as an addition to the British Fauna in the Supplement to his British Stalk-eyed Crustacea. Professor Melville himself was one of the first to point out the apparent injustice done to M'Calla.

The species, from my experience of it in confinement, is sluggish, but a determined animal feeder, destroying even large bivalves, Actiniæ and Palæmons, some 2 inches long; it is also apparently a night-feeder. Galway Bay, Roundstone (W. M'C.)

Munida Rondeletii.—Belfast (W. T.), Youghal (R. B.), Cove (J. V. T.), Galway (A. G. M.), Roundstone (?) (C. F.)

Crangon spinosus.—Cove (J. V. T.), Galway (A. G. M.)

Nika edulis.—Cove (J. V. T.), Roundstone (A. G. M.)

Athanas nitescens.—Lahinch (W. T.), Ballyvaughan (A. G. M.), Roundstone (W. M'C.)

SUPPLEMENTAL DUBLIN SPECIES, pp. 80–87.

Pirimela denticulata.—Dalkey Sound, dredged a single female specimen, May, 1857, loaded with ova. After it had been kept in a tank for three weeks, the ova changed their colour from a bright salmon-red to a dirty brown: this change examination with the microscope showed to be dependent on the development of the zoes in the ova, their black eyes showing plainly through the integuments. I was unable at the time to examine them further; and the following day, to my great regret, I found that the ova were all shed, and the tank filled with zoes.

These were extremely active, tumbling about in all directions, swimming by alternately rolling up and unclosing their jointed bodies, and throwing complete summersaults; when they rested, it was on their

backs, the body supported on the dorsal spine. I do not know whether this is the normal position for them or not. The abdominal false feet were kept in perpetual motion.

In figure (Plate IX., Figs. 4, 5) they appear identical with zoeæ bred by J. V. Thompson from *Canc. pagurus* (Zoological Researches, Plate VIII., Fig. 1), as might have been expected from the close relationship of the genera; indeed, I am inclined to think that the zoeæ of the Brachyura, at least, will be found to be nearly undistinguishable, the apparent difference in the figures published arising from the difficulty of making perfect microscopic observations, arising from the transparency of the various parts. If we compare the figures here given with Thompson's figure of zoea of *Pinnotheres pisum* (Ent. Mag., vol. iii., p. 85; Bell's British Crustaceæ, p. 125), we will at once perceive their strong similarity. Although I examined twenty or thirty specimens of this zoe, I only succeeded twice in getting the lateral spines in full view: they are represented rather too long in my figures.

The spiny curvature was as follows:—Arising out of the centre of the carapace a long, curved horn; between the eyes a curved rostrum; on each branchial region a short scimitar-shaped horn; and lastly, a very short, slender, hollow horn, arising from the posterior edge of the carapace at its junction with the abdomen. Three fine hairs, also, are found arranged in a line along the median line of the carapace posteriorly.

The abdomen consists of five segments. The first, or that nearest the cephalo-thorax, with a protuberance about half-way down, and furnished with a hair (represented as a spine by the artist) at its inferior external angle; this joint is somewhat quadrilateral. The second, third, and fourth decrease gradually in size, and the terminal joint ends in a semilunar tail (Fig. 6, back view, magnified 350 diameters) furnished with six tubular spines, each distinctly articulated to a jointed peduncle; the edges of these spines are finely serrately ciliate, and the internal pairs furnished internally each with three hollow spines communicating with the cavity of the primary spine; a short spine is also found at the origin of each semilunar arm; a plate of very peculiar form arises from the articulation of the fourth and fifth joint posteriorly, and projects below the termination of the tail; in other particulars my specimens agree with J. V. Thompson's descriptions.

The circulation, as seen under a power of 350 diameters, is extremely curious: a closed (?) pulsatile vessel running down the back, with dilatations at each articulation; in this a regular flux and reflux of fluid might be seen, accompanied by dilatations and contractions of the dilated portions. Besides this, a regular circulation, whose course was not easy to make out, was to be seen passing along the sides and through the horns, and even into the three little hollow spines with which the caudal primary spines were furnished.

Antrim (W. T.), Dublin, Dingle (W. Andrews), Lahinch (W. T.), Galway (A. G. M.), Roundstone (W. M'C.)

Ebalia Pennantii.—Bray, May, 1857, Scallop bed. The late Robert Ball, LL. D., showed me a specimen from Dalkey.

Belfast (O. C.), Dublin, Cork (C. C. S., J. V. T.), Galway (A. G. M.), Roundstone (W. M'C.)

Pagurus levis.—What I take to be this species has occurred to me both in Dalkey and also at Bray; it differs from *P. Hyndmanni* chiefly in the comparative length of chelæ.

Portaferry (W. T.), Dublin (?), Galway (A. G. M.)

Galathea nexa.—A small species, which I take to be this, occurs pretty plentifully in Dalkey Sound and Bray, in 12–30 fathoms; it spawns in March, April, and May.

As contrasted with *Galathea squamifera*, the following points call for notice:—

Rostrum short, furnished with four flattened, hollowed teeth on each side; the hindmost pair situated on the orbit. (In *Gal. squamifera*, five spines, the hindmost two as *G. nexa*). Anterior pair of legs narrowed, elongate, covered with a few tubercles, terminating, for the most part, in a single spine; some, however, pass into denticulate squamæ: these tubercles are arranged on the hands in nearly parallel longitudinal lines, contrasting with the densely squamiferous anterior limbs of *G. squamifera*. The hands are narrow and elongate, the fingers nearly parallel, finely denticulate, scarcely hairy, terminating in a fine nail; they are slightly spinous on the exterior. External foot-jaws, second joint equalling third. The description of *G. nexa*, in Bell, is so succinct that I am not quite sure whether this may not be a nondescript species.

Antrim (W. T.), Dublin (?)

Palinurus vulgaris.—Although rare, there can be no doubt this species has occurred in Dalkey Sound, and of large size.

Astacus fluviatilis.—Once, at least, in Bray River; common in streams about Maynooth, and also formerly taken in the Liffey. I have seen specimens from the following counties:—Longford, Cavan, Tipperary, Kildare, Dublin, Kilkenny, Meath. It is probably to be found nearly all through Ireland.

Crangon fasciatus.—Of this rare species I met with specimens at Sandycove, in the sandy pools, in a zostera bank at extreme low water. Spawns in May. Every one of my specimens shows the broad black band most distinctly.

Dublin, Bray (R. B.), Galway (A. G. M.)

Hippolyte varians.—This species occurs in great numbers in the sand-pools among the zostera banks at Sandycove, near Kingstown; spawns in May. The specimens vary remarkably and beautifully in colour: pink, red, salmon, emerald-green, cobalt-blue, gray, chocolate-brown, opal white, are among the prevailing tints; the ova of a chocolate brown.

It is remarkably sensitive of handling; in no case could I succeed in keeping it for over forty-eight hours in a tank, although specimens of *Crangon fasciatus* and *Mysis chameleon*, from the same locality, lived with me for days. A volume might be written on the forms of the beak

of this species. I have figured (Plate X.) the best-marked varieties, which occurred in the following proportions:—

Plate X., Fig. 1.—*a*, Normal type; rostrum nearly straight; apex bidentate, directed upwards, upper tooth shortest; below two teeth, the anterior much posterior to the upper tooth of apex; proportional frequency of occurrence, 63 per cent.

Fig. 2.—*b*, Rostrum straight; apex tridentate, teeth directed forwards, upper and lower teeth nearly equal in length; below, one tooth only; proportional frequency, 25 per cent.

Fig. 3.—*c*, Rostrum strongly curved upwards, scimitar-shaped; apex tridentate, upper tooth slightly longer than lower; below, a single tooth; proportion, 8 per cent. N. B. The whole animal is much slender than the normal type: query, *a species*?

Fig. 4.—*d*, Rostrum straight; apex broadly truncated, directed forwards, quadridentate, apical teeth very minute; below, two teeth; proportion, 2 per cent.

Fig. 6.—*e*, Rostrum straight; apex acuminate, *simple*, directed upwards; rostrum with two teeth below. One specimen out of 300 examined.

Fig. 5.—*f*, Rostrum straight; apex bifid; rostrum with *three* teeth below, viz., one beneath apex and two closely approximated in the broadest portion of the rostrum. One specimen.

All these specimens, in addition, have the basal superior tooth (characteristic of the species). Another curious form had the rostrum very much curved upwards, apex simple, and teeth below absent. These all were from the same pools, in company with the next species, *Mysis chameleon*, *Carcinus manas*, *Cancer pagurus*, and that strange edriophthalmous Crustacea, *Apseudes talpa*, its first record, I believe, on the Irish coasts.

For distribution, see Paper read in April.

H. Cranchii (Plate X., Figs. 7 and 8).—In the same pools with last, but rarer; in spawn in May; spawn of a chocolate-brown colour; varieties with three and four teeth on the rostrum occur.

H. pusiola (Kroyer) (Plate IX., Fig. 2, *a*, *b*, *c*; and Plate X., Figs. 9, 10).—I first met this species, in 1854, in Dalkey Sound, when I laid it aside as a variety of *H. Cranchii*. The constancy of its characters have since caused me to alter this opinion, and, not finding it described in any of the English or French authorities, I was led to describe it as new, under the name of *H. Andrewsii*. Since then, however, a paper of Kroyer's on the Hippolytes of the North, published in the "Royal Danish Society's Transactions," has come into my hands, in which I find a species described as *H. pusiola*, which I must look on as identical with that under consideration: I, therefore, feel compelled to adopt Kroyer's name, for the present, or until better informed on the subject.

The species is known to the English naturalists, by whom it is looked on as—that zoological convenience—a "mere variety" of *H. Cranchii*;

but the characters which mark it out are so constant and trenchant, that I feel no hesitation in asserting its claims to *specific* distinction, and most probably it will be found to be one of our best-marked northern types, as I have not seen any specimens of it in southern or western collections, and the only notice I find of it in English works is by Dr. Howden, Scotland.

HIPPOLYTE FUSIOLO (Kroyer).

Rostrum short, curved upwards; *apex acuminate*, 3-4 dentate above; below unarmed; a strong tooth arising from carapace immediately over eye; median plate of tail 4 pairs of spines; wrist of second pair of legs 4-jointed.

The whole animal is much larger and more truncate than *H. Cranchii*; the rostrum narrower; apex slightly curved upwards, simple; the rostrum armed with 3-4 curved teeth above; external antenna as long as the entire body; the antennal scale rounded at its inner superior extremity; the lateral tooth terminal and its peduncle strongly toothed externally; internal antennæ hairy, the inferior external angle of the articulation prolonged into a curved scimitar-shaped lobe, the superior angle prolonged into a tooth; second and third articulations also toothed; anterior feet slightly shorter than antennal scale, stout.

Second pair of feet,—wrists made up of four articulations, the total number in the whole limb being eleven, including the hand; the first, second, and third very short and somewhat triangular; the fourth, fifth, and sixth long, slender, and equal among themselves; seventh, slightly shorter, cylindrical, slender, a few scattered hairs over its external surface; eighth and ninth very short, scarcely conjoined equalling seventh, equal and globular; tenth, equalling seventh. A strong tooth over each eye at base of rostrum, and a small tooth over origin of antennæ.

Colour, rose-pink or green, though there is much variety in this; one specimen (a female), taken in May, was coloured as follows:—Carapace, a transparent clear pink, with which the emerald-green masses of extruded ova contrasted most vividly, tail and segments of legs being banded with white and rose colour. Another specimen was even more vividly coloured:—Carapace clear cobalt-blue, through which the emerald-green masses of ova shone, the remainder of the body a clear pink; the legs prettily banded with a darker red.

It has only occurred to me in comparatively deeper water, as at Bray and in Dalkey, where it is frequent in the lobster and crab pots. Of its distribution nothing is known: it has been recorded in Scotland by Dr. Howden, from Frith of Forth and Orkney.

The characters of the rostrum and carapace; second pair of legs, median plate of tail; size; and difference of locality separate it markedly from *H. Cranchii* (*vide* Plate X., Figs. 7, 8, 9, 10, and Plate IX., Figs. 2A, 2B).

Palæmon squilla.—Extremely common in rock-pools, especially among *Enteromorpha intestinalis*. In ova in May, April, and June. Of one remarkable form of this species (?) I have figured the beak (Plate X., Figs. 11, 12, 13, 14); it is invariably much smaller than the normal

type, and frequents pools which are less frequently visited by the tides. In colour and other characteristics I find such a close accordance, I must look on the characters drawn from the beak as not of specific importance, the only other difference being in the comparative weakness of the didactyle hands. The following are the varieties in the number of teeth of the rostrum met with:—Apex bidentate, above 7–10, below 2–4; apex simple, above 7–9, below 2–3; the commonest form being 7 or 8 above, apex bidentated, and 3 below.

Belfast (W. T.), Dublin, Galway; doubtless confounded with *P. serratus* in lists.

P. Leachii.—I have seen no authentic Dublin specimens of this species; all those shown me either preceding species, or *P. varians*. I have collected specimens in Galway, and Professor Melville showed me numerous specimens collected there by him. The specimen thus named in J. V. Thompson's collection is not this species, but the variety (?) of *P. squilla*, described above.

Dublin (?), Galway.

Mysis chameleon.—Much commoner than I formerly stated; very abundant in sand-pools; in ova in March, April, and May. The ova are easily hatched, and the young are similar to the parent when extruded.

Before concluding, it may be interesting to compare the relative distribution of the genera and species in the east and west, when we arrive at the following results, excluding from our comparison those strange forms, *Bodotria*, *Alauna*, &c.

BRACHYURA.

Common to both districts,	23
Unrecorded in east, made up as follows:— <i>Achæus</i> , <i>Pisa</i> , <i>Maia</i> , <i>Xantho</i> (3?), <i>Portunus</i> (2), <i>Ebalia</i> (?), <i>Thia</i> . Those genera peculiarly typical italicized, .	10
Unrecorded in west,	0
Brachyuri,	— 33

ANOMOURA.

Common to both,	11
Unrecorded in east, viz., <i>Pagurus</i> (1), <i>Munida</i> (?), .	2
Unrecorded in west, viz., <i>Pagurus</i> (1), <i>Galathea</i> (1),	2
Anomoura,	— 15

MACROURA.

Common to both,	11
Unrecorded in east, viz., <i>Crangon</i> (2), <i>Alpheus</i> , <i>Nika</i> , <i>Athanas</i> , <i>Palæmon</i> (1), <i>Hippolyte</i> (1), .	7
Unrecorded in west, viz., <i>Hippolyte</i> (1), <i>Crangon</i> (2), <i>Palæmon</i> ,	4
Macroura,	— 22
Stomapoda, common to both,	2
Omitted in above list,	8
	— 10

Total *Crustacea podophthalmia*, 80

The Irish species unnoticed in these lists are—

Inachus leptocheirus.

Belfast (O. C.), Clifden (W. T.)

Xantho tuberculata, *Polybius Henslowii*, *Pinnotheres pinnae*.—Obtained once in the south.

Gebia deltura, *Callianassa subterranea*, *Calocaris Mac Andree*.—Obtained once in the north.

Pasiphaea sivado.—A single specimen in Dublin Bay.

Careful research will, doubtless, disturb these conclusions slightly; and I am sure that many unrecorded species, especially among the Anomoura and Macroura, yet remain to reward the labourer in these prolific fields of watery research.

In conclusion, with regard to the provisional species recorded in my last paper, as I suspected, *Porcellana priocheles* appears to be one of the young states of *P. longicornis*; *Pagurus Eblanensis* I strongly suspect is the true *P. Uldianus* of W. Thompson; and *Portunus carcinoides* (Plate IX., Fig. 3, a, b, c) is a good species; it comes very close, however, to Otto's *P. infractus*, which is included by Bell among the synonyms of *P. longipes*, Risso, from which the trilobed front and length of legs would separate my specimen.

I would also correct an error in my description of *C. Allmanni* (pp. 81, 82), in describing the arm of that species as smooth in many specimens: it is distinctly spined.

After the conclusion of Dr. Kinahan's paper, the Chairman declared Alexander Henry Haliday, Esq., F. L. S., M. R. I. A., duly elected an Ordinary Member.

The meeting was then adjourned till May.

FRIDAY EVENING, MAY 1, 1857.

CHARLES P. CROKER, M. D., M. R. I. A., V. P., in the Chair.

The Minutes having been read and confirmed,—

Mr. W. ANDREWS read the following—

NOTES ON THE ORNITHOLOGY OF THE COUNTY OF KERRY.

It has always been my opinion, that the zoology of the western portions of this country, embracing the whole range from north to south, had yet to be developed, and that it may be said that scarcely two-thirds of the species have as yet been recorded. Our knowledge of the marine zoology of the western coasts is still very imperfect, especially as regards the deep-water species. Thus, it were an interesting inquiry to trace the peculiarity of habits of those species which, though common on our shores, and animals of the most delicate and fragile texture, are yet found of frequent occurrence in deep-water soundings.

My chief business this evening is with reference to notes on the birds of this country that are considered "occasional or very rare visi-

tanta." These expressions frequently appear in works on British ornithology, and I am satisfied must be considered as owing to the want of proper information, arising from a lack of observation throughout each season of the year, and especially from ignorance of the characteristics and habits of birds in the immature states.

There are several of the gentry whose tastes lead them to make collections of the birds of their immediate neighbourhood, and others who occasionally note occurrences that appear singular or strange to them; but still there is a general dearth of knowledge of seasonal records throughout the country. The collections of my friend, R. Chute, Esq., of Chute Hall, near Tralee, testify, by the great amount of interesting objects he has obtained, what individual zeal can accomplish. The sub-alpine districts of Kerry, with their numerous lakes, estuaries, extensive marshes, and wooded glens, still afford ample fields for observation; and we shall yet learn, through well-directed and continued observations, that the records of—"must only be considered of extremely rare occurrence," should be, "by no means uncommon."

Thus, the immature Iceland Gull (*Larus Islandicus*), I am sure, is, at certain seasons, frequent on the west coast. It has been shot near Tralee, and the immature bird has been seen in numbers.

In the Transactions of this Society are recorded the immense flocks of the Greater Shearwater (*Puffinus major*) seen in Dingle Bay, and also notes of the Bridled and Brunnich's Guillemots (*Uria lacrymans* and *Brunnichii*), having been observed breeding on the Tiraght Rock. The former bird, with the eggs, have been obtained at the entrance of the Shannon, by Henry Burton, Esq., of Carrigaholt Castle. The King Eider Duck (*Somateria spectabilis*), and several rare species of Tringa, have also been captured in Kerry.

The Martinique Gallinule (*Gallinula Martinico*), which was captured in the living state in a drain at Clehane, Brandon, county of Kerry, was at first by Mr. W. Thompson supposed to be, and described as, the Sicilian Gallinule (*Porphyrio hyacinthinus*), from the supposed impossibility of a bird of the United States of America being met with in Ireland. An examination of its characters satisfied me it must be the Martinique Gallinule, and I wrote so to Mr. W. Thompson, who afterwards admitted that my views were correct.

The Dusky Petrel (*Puffinus obscurus*), a bird of Australia, was also obtained alive off Valentia Island, and was exhibited in this Society in 1854.

The Bohemian Waxwing (*Bombycilla garrula*) has several times been noticed in Kerry. A very beautiful specimen is in the Museum of the Society, taken near Miltown, county of Kerry, and presented through the kindness of one of the Members, Joseph Anderson, Esq.

You have already had recorded the Membranaceous Duck (*Malacorynchus membranaceus*), which was shot in Castlemaine Bay, where six were observed together, and supposed by the sportsman to have been teal. It has been remarked, that this bird "could not have occurred in

Kerry except as one escaped from confinement." I believe in no British collection has this species existed but in that of the late Earl of Derby, and I have been informed that none were lost from that collection. It might just as well be imagined that the Great Spotted Cuckoo (*Cuculus glandarius*) and the Belted Kingfisher (*Alcedo alcyon*) were escapes from confinement.

The two very fine specimens of the Crane (*Grus cinerea*) which are in our Museum, were shot the same season in this county, one of them near Ballinskelligs Bay, county of Kerry, out of a flock of five. It was sent to me by my esteemed friend, the late Maurice O'Connell, Esq., of Derrynane Abbey, supposing it to be the Great American Heron (*Ardea Herodias*), which, with the exception of its great size, is similar to the Common Heron of Europe. The former bird averages 4 ft. 7 in. in height, and weighs 7 lbs., while the latter but 3 ft. 3 in., and weighing 4 lbs. *Ardea Herodias* frequents the gloomy solitudes of the tallest cedar swamps of New Jersey; the Common Heron (*A. cinerea*) is not an inhabitant of the United States. The extreme length of the crane obtained in Kerry was 4 ft. 7 in., and its weight was 12 lbs. Mr. O'Connell was led to suppose the bird American from numerous incidents he had noticed: he was an admirable shot and sportsman, and a great admirer of the writings of "glorious old White of Selborne," as he termed him.

Thus in one of his numerous communications he remarks with regard to the woodcocks:—

"My observations lead me to suppose that we have two immigrations—one from the northern parts of Europe, the other from America. I have shot what certainly appeared to be two varieties, if not distinct species: one much smaller than the ordinary woodcock, more of a rufous colour, and destitute of the varied markings which distinguish the latter. I have met male and female of both kinds, and have shot both kinds late in the season when paired, each with a mate of its own description. A friend who was with me in the winter of 1840 (Captain Broderick, 34th Regt.), and who had just returned from Canada, where he had shot many dozen braces of woodcocks, was at first incredulous as to the fact of the immigration from America. On going out with me it happened that the first couple of birds we flushed were of the smaller kind. We met them at some hundred yards' distance from each other, and at an interval of a quarter of an hour on an open mountain, where we had a full opportunity of observing them. He appeared surprised on seeing the first; but when the second rose he turned to me and said, 'You are right—these are exactly the American birds, wherever they came from.' Unfortunately we did not get shots at either of these birds, and killed but one of the kind after, as the day became bad; but he admitted, on examining that closely, that it was, as he called it, 'a Yankee bird.'"

The American woodcock differs much in size from that of Europe, the male bird scarcely averaging six ounces, and the female eight ounces; while the European birds exceed twelve ounces. The lower parts and

breast of the European woodcock are marked with large spots and zig-zag transverse lines and bars of black on a pale dull yellow and gray ground. These marks are altogether absent in the American bird, whose colour on the breast is bright ferruginous; the back and scapulars are of a lighter colour, and not so deeply marked. The small specimen which is now exhibited was obtained from Nova Scotia.

One of the Mr. O'Connells, of Grena, near Killarney, informed me that some years since he had seen nailed on a door by one of the game-keepers a jay, identical with the American blue jay (*Garrulus cristatus*).

In the month of June, 1855, when for a few days at Killarney, I met on the grounds of the Lakeview Hotel a man with a young bird of the spotted eagle (*Aquila nevia*). I was anxious to obtain it, but he said that he had promised it for sale to a gentleman whose return he was waiting from boating on the lake; his price was £1. On the following morning he called to leave the bird with me; but both at the Hotel and at Mr. Boylan's (Lord Kenmare's steward), in whose charge he wished to leave it, it was refused, as I was absent. I could obtain no trace of the bird, as the man had to return to his home westward in the Beeks, in which part of the country, in a mountain towards Cahirciveen, he had taken the bird from the nest. Its much smaller size, and the peculiar spotted markings which characterize the young state and bird of the first year left no doubt on my mind as to the species.

The Mergansers have been noticed to remain in Kerry throughout the year; and the Scaup Duck (*Anas marila*); with the eggs and the young, has been taken in an inland lake.

The bird which I now present to the Society, the Horned or Slavonian Grebe (*Podiceps cornutus*, *P. obscurus*, in the young state), and which, in Thompson's Birds of Ireland, is quoted—"can be positively announced only as an occasional visitant," was lately obtained at the mouth of one of the streams near Lough Caragh, county of Kerry, where, no doubt, others will be met.

Through Europe this has the widest range of all the Grebes; but it has been considered as extremely rare in the British Isles. The markings are very perfect in this specimen; but the dark frill and the bright chestnut-coloured feathers or horns, which characterize the species, are not shown except in the breeding season. It is distinguished by its bright chestnut rufous-coloured neck, and by the rufous-coloured marks passing from the base of the bill to and through the eye to the occiput. This at once distinguishes it from the rare species, the Eared Grebe, *P. auritus*, which has not the rufous-coloured neck; the markings of the bill are also characteristic, the bill of *P. cornutus* being black, tipped with yellow, and the lower mandible marked with yellow, the belly silvery, and of a soft, silky texture.

Mr. J. B. Doyle remarked on the extreme interest of these observations. He thought it evident that, if we had more certain records of this kind, many birds at present marked in our list as rare stragglers

would be found to be more frequent visitors, especially in the west. There were many gentlemen resident in that part of Ireland who possessed interesting collections of birds captured in that district. He might mention one. In the collection of Edward Burton Eyre, of Clifden, the following rare birds, all captured about the Burren, were to be seen:—The Glossy Ibis (*Ibis falcinellus*), Bohemian Waxwing (*B. garula*), Siskin (*Carduelis spinus*), Sabine's Snipe (*G. Sabini*). He had himself had the good fortune to have seen alive the specimen of the Martinique Gallinule to which Mr. Andrews referred, and there could be no doubt as to the circumstances connected with its capture. It was found alive, but exhausted, in Brandon, in a creek, but died not long after its capture.

The Rev. Professor Haughton brought forward a motion by which a new class of Members, to be called Associates, should be formed (*vide* end of Transactions). Undergraduates of the University to be especially eligible for this class of Membership. The Associates to have privileges of Members, to be resident in or about Dublin, and to be elected by a vote of the Society, on the previous recommendation of Council. The subscription for this class to be limited to 5s. a year, to cover expenses.

This was seconded by Dr. G. B. Owens, and, after having been fully discussed, was passed unanimously.

By a resolution of the Society it was also determined that Corresponding Members, paying 5s. annually in advance to the Treasurer, should be entitled to the Monthly Report of the Society's meetings, and a copy of the Society's Proceedings.

After due ballot, Edward Hamilton, M. D., 8, Stephen's-green, was declared duly elected an Ordinary Member.

The meeting then adjourned till June.

FRIDAY EVENING, JUNE 12, 1857.

PROFESSOR W. H. HARVEY, M. D., M.R.I.A., F.L.S., President,
in the Chair.

The Minutes having been read and signed,—

PROFESSOR KINAHAN read some notes—

ON A REMARKABLE VARIETY OF TRICHOMANES RADICANS (KILLARNEY FERN).

THE form of this beautiful and well-known fern, which I lay before your Society to-night, was first brought under my notice by Mr. John Bain, the Curator of the University Botanic Gardens, and is peculiarly interesting, as affording an example, among the "Muscoid" ferns, of that form of monstrosity which is met with rather commonly in some genera of our native ferns, and for which I proposed the name of *Laciniatum* in a paper read before your Society in 1853. The departure from the normal form consists, as there stated, in a depauperation of the membranous portions of the frond, the more vascular portions remaining

unaltered, and the frond being in consequence generally either scalloped at its edges, or reduced to a linear condition. The fructification is generally absent in this form.

The causes or conditions which give rise to it are extremely obscure. In *Scolopendrium* it is generally most prevalent in plants from a dry station, but in *Trichomanes* I find it prevails in plants from the very wettest localities; for, since my attention was called to the form, I found, on examining a case of ferns, put up four years ago, that plants from a station of this kind, which I had then laid aside as young plants, have preserved their characters unchanged up to the present, nor do they show any appearance of fructification, though plants in the same case and from the same localities are loaded with fruit. These characters are permanent.

The plants exhibited were obtained by Professor Harvey some years back at Killarney, and have preserved their characters unchanged ever since. I may add, before concluding, that a careful examination of this fern, in its Killarney stations, has led me to conclude that the plants there are, so to speak, drawn up, and that the fact of the difference between them and those from Waterford and Glouin Caragh, as regards fructification and form of frond, are altogether dependent on a law which prevails among the ferns, that when the membranous portion of a frond is developed more than normally, it is so at the expense of the fructification. I may also add, that an examination of the Valentia Island station of this fern has convinced me that the plant has been introduced there.

The CHAIRMAN read a communication—

ON *LONICERA XYLOSTEUM*, AN ADDITION TO THE IRISH FLORA.

THAT well-known garden plant, which has been recorded as yet in only a few stations in England, *Lonicera xylosteum*, was found in 1852, in an undoubtedly wild state, at a great distance from cultivation, on the Kippard Mountain, in a copse near the Cabhole, about six miles from Mountmellick, by Mr. John Jessop, who forwarded this notice of its discovery.

PROFESSOR KINAHAN read the following letter from MR. G. V. DU NOYER, M. R. I. A., Associate Member :—

ON A REMARKABLE FORM OF *ECHINUS LIVIDUS*.

“*Dingle, Tralee, May 21, 1857.*

“MY DEAR KINAHAN,—The rough outline on the opposite page may give you some idea of an *Echinus* I found the other day on the rocks among seaweed, at the Coastguard station, Minard. I have taken possession of it, and intend giving it to the Natural History Society. As well as my memory serves me, I have not before remarked an *Echinus* of this particular shape; many of the creatures are four or five inches across, and proportionally high.

“Yours sincerely,

“GEORGE V. DU NOYER.”

The specimen referred to was exhibited; its most remarkable characters were: the base, pentangular in outline; the summit, instead of being flattened, as in all the typical forms of *Echinus lividus*, is produced to a point, so that its height nearly equals its transverse diameter. The arrangement of the pores and tubercles of the *ambulacral plates* are identical with that in specimens of *E. lividus* from Valentia Island, but the *ovarian plates* and *nucleus* differ from those of *Echinus lividus*, and are, on the other hand, identical with the form of these parts in *Echinus sphaera*; in fact, in many of its characters this specimen is intermediate between these two species.

The specimen sent up unfortunately wants the spines, so that it is doubtful whether it may not be a species distinct from either *E. lividus* or *E. sphaera*. An *Echinus lividus*, pentangular in form, is recorded in Forbes's "British Starfishes," page 168, but no details are given, and the pentangular *E. sphaera* is well known.

Professor Kinahan also exhibited a very fine living specimen of the spiny crossfish, *Uraster glacialis* (Link.), from Dalkey Sound, which had been sent to him by D. J. Corrigan, M. D., M. R. I. A. This specimen was remarkable for its colour, the species is common in Dublin Bay, in from 10–30 fathoms; its occurrence there was first recorded from a specimen presented to this Society by Dr. Corrigan in 1853. There is a very remarkable variety (?) of *Uraster rubens*, which occurs abundantly when dredging on the Kish Bank, which may be mistaken for this species, and which suggests the question whether two species have not been confounded under the name of *Uraster glacialis* in our lists. The characters of the papillæ around the spines at once marks out the true *U. glacialis*; in the variety spoken of the spines are perfectly naked, whilst in *U. glacialis* they are surrounded by a fleshy mass, crowded at its summit with numerous small spinules.

The Chairman, under the new rules, declared the following duly elected:—

Joseph Rees Greene, Associate Member.

William Kennedy, Limerick, Corresponding Member.

W. Lecky, Valentia, Corresponding Member.

The Session was then declared closed, and the Society adjourned till November.

ADDENDUM TO SUPPLEMENTAL DUBLIN LIST OF CRUSTACEA (SEE MEETING, APRIL 17, 1867). BY JOHN R. KINAHAN, M. B.

THE *Galathea* referred to in the above list as *G. nana* proves to be an unnamed species; it is therefore figured, and a further description of the species is appended; also a description of the new *Iphimedia* figured in the same plate, from a drawing furnished me by C. Spence Bate, Esq., F. L. S., who has kindly described the species, though too late for insertion in its proper place.

GALATHEA ANDREWSII (*mihi*). Plate XVI., Fig. 8, *a*, *b*, *c*, *d*.

G. rostro brevi, 3-5 *dentibus utrinque ornatis*. *Pedibus anticis rotundatis elongatis, angustis sparse tuberculatis, tuberculis spinosæpissime terminantibus*. *Chelis digitis parallelis, elongatis angustis rictu minute denticulato, apice adunco; maxillepedibus externis articulo secundo tertium æquante*.

Habitat: "Sinum Maris Hibernicæ, 'Dublin Bay,' dictum."

This species combines the characters of the genera *Munida* and *Galathea* to a great extent: it manifestly belongs, however, to the latter genus. I have named it after William Andrews, M. R. I. A., whose researches into our native zoology and botany have so often been laid before this Society.

The characters of the narrowed, elongated hands, their comparative freedom from spines, the small size of the species, and the character of the beak, separate it from all described species. For further particulars concerning it, see Supplemental List: it is extremely common.

ON A NEW AMPHIPOD. BY SPENCE BATE, F. L. S.

PLATE XVI.

IPHIMEDIA (*Rathke, n. a. xx.*). I. *EBLANÆ* (*mihi*).

Head produced into a rostrum; antennæ unfurnished with secondary appendage, subequal; the last segment of the pereion and each of the three anterior segments of the pleon armed, lateral to the dorsal ridge, with two parallel rows of teeth.

The three anterior segments of the pleon each armed with a well developed tooth in the median dorsal line.

[*I. capite rostrato. Antennis simplicibus subæqualibus. Corporis segmentis 8-11, duabus dentium parallelum seriebus, lateraliter armatis, 9-11, forte dente medio dorsi, ornatis.*]

This species differs from *I. obesa*, on which Rathke founded the genus, in several very important points. The rostrum is more incurved; the infero-posterior edge of each segment is more pointedly produced; but that which most strongly strikes the notice is the elevation of a well-developed tooth on the centre of the dorsal surface of each of the

three anterior segments of the pleon; whilst on the next succeeding there is a prominence as if a tooth had been arrested in the course of development.

On each side of the dorsal centre there exists a tooth, formed by the projection of the posterior margin, of each of the three segments that carries a central tooth, as also the last segment of the *percion*, on which a central tooth does not exist.

Lower down on each of the three anterior segments of the pleon a second row of similar teeth exists on the posterior margin, and the two posterior of these same have each the infero-posterior point produced into a tooth; those upon the third segment are all curved upwards.

The anterior pair of Gnathapoda (Fig. 5) are simple; the dactylos in this species is either rudimentary or fused with the preceding joint; the extremity of the leg is tipped with six strong hairs, curved and reversely ciliated (Fig. 5A).

The second pair (Fig. 6), as also the mandibles (Fig. 3), and other appendages of the mouth, offer no great difference from the same organs in *I. obesa*.

Telson (Fig. 7) single, notched at the apex. I have named it after the place of its discovery.

This crustacean was taken by Professor Kinahan from the gill cavities of *Rhizostoma Cuvieri* in Dublin Bay.

There is undoubtedly much to be learned of the habits of animals that are taken from deep water by the aid of the dredge; yet from what we do know I am inclined to think that the position in which *Iphimedita Eblance* was taken must have been one of accident rather than its natural habitat. I have never taken *Isœa Montagui* except on the back of a crab (*Maia squinado*); and the *Isopod Astacella longicorne* infests the spines of *Echinus sphæra*. But these are not parasitic in their habits, such as *I. Eblance* we must suppose to be, if its natural abode is within the walls of the gill cavities.

EXPLANATION OF FIGURES. PLATE XVI.

Fig. 1, lateral view; Fig. 2, dorsal; Fig. 3, mandible; Fig. 4, maxilliped; Figs. 5 and 5A, first gnathopod; Fig. 6, second gnathopod. Fig. 7, telson.*

DONATIONS TO MUSEUM, MAY 1, 1857.

Vere Webb Macnally, Esq.—One hundred specimens of native Lepidoptera. *Nephrops Norvegicus*, Dublin Bay.

William Andrews, Esq., M. R. I. A.—*Podiceps cornutus*, Lough Caragh, county of Kerry; eggs of *Sula bassana* and *Ardea cinerea*, county

* Eight specimens of this species were found by me swimming merrily in the gill cavities of a *Rhizostoma*, which had been driven ashore, after a high gale, at Merriou, county of Dublin, in the autumn of 1854. The specimens have been unfortunately mislaid, except that figured above, which is now imperfect.—J. R. K.

of Kerry; and breast-bone of *Grus cinerea*, shot in county of Kerry, and presented to this Society some time since by the late M. O'Connell, Esq., M. P.

JUNE 12, 1857.

George Victor Du Noyer, Esq., M. R. I. A.—*Echinus lividus* (a variety), Minard, county of Kerry.

Richard J. Ussher, Esq., Cappoquin.—Eggs of *Fregilus graculus*, *Otus vulgaris*, and *Coturnix dactylisonans*, county of Waterford.

W. M'Dougall, Esq.—A black egg of the black East India duck.

John Robert Kinahan, M. B.—*Portunus carcinoides* (new species), Valentia; *Pagurus Eblaniensis* (new species[?]); *Porcellana longicornis*, *P. platycheles*, *Galathea Andrewsii* (new species); *Homarus vulgaris*, *Crangon fasciatus*, *Hippolyte pusiola*, *Pandalus annulicornis*, *Palæmon squilla*, *P. varians*, *Mysis vulgaris*, Dublin; *Palæmon serratus*, *Palæmon Leachii*, Galway.

TO THE LIBRARY.

"Reminiscences of Ice Travels," by Captain M'Clintock, R. N., &c.; from Rev. Professor Haughton. "Canadian Journal of Industry," Nos. I. to VIII.; from the Canadian Institute, Toronto. "Transactions of Geological Society of Dublin," complete; from the Society. "Journal of the Royal Dublin Society," Nos. I. to VI.; from the Society.

RECORD OF THE OCCURRENCE OF THE BERGYLT AND GREENLAND BULLHEAD
ON THE IRISH COAST. BY WILLIAM ANDREWS, M. B. I. A., HONORARY
SECRETARY.

1. BERGYLT, OR NORWAY HADDOCK (*Sebastes Norvegicus*).

THE first record of this addition to the ichthyology of Ireland was made by Mr. Andrews, Honorary Secretary, at a meeting of the Society held on the 4th of May, 1849. Two fine specimens of the fish were taken in the month of March last, on the long lines set for ling, in deep water, off the Wild Bank, Dingle Bay, and brought in by canoe-men in the employment of the Royal Irish Fisheries Company.

Several specimens have since been taken in the same bay, and in the summer of 1850 two were taken, in eighty-one fathoms, off the Blasket Islands, coast of Kerry, on long lines set for cod, one of which Mr. Andrews had for some hours alive in a tub of sea-water.

The *Sebastes* is an exceedingly active fish, and apparently of pugnacious habits. In the recent state its colour is very vivid, of a beautiful vermillion, the shades dark on the back, assuming a lighter tinge on the sides, and passing into a silvery white on the belly. The pectoral fins are large, of a bright red colour, as is also the caudal fin, the fins terminating in filaments. The eyes were very brilliant, particularly large and prominent. It is nearly connected with the Serrani in the ovate body, obtuse head, large eyes, and formation of the jaw,—the jaws, head, and body being covered with rough scales.

The Bergylt is a northern fish, and inhabits deep water, and is known as the Norway Haddock and Norwegian Carp. In the Feroe Islands it is very frequently taken, in deep water, when fishing for cod, where it is termed Kongafisshur and the Red Perch (*Perca Norvegica*). It is also called in Feroese Raff-fisshur, from its red colour. The *Sebastes*, although known to the Shetland fishermen, is a fish of rare occurrence in British ichthyology, and but few authentic specimens are recorded as British.

2. GREENLAND BULLHEAD (*Cottus Grænländicus*).

Was taken in Dingle Harbour, county of Kerry, in the month of February, 1850, when drawing a seine for sand smelts. Its beautiful and vivid colouring attracted the attention of Mr. B. Hilliard, Agent to the Royal Irish Fisheries Company, who, presuming it to be of rare occurrence, at once forwarded it to Mr. Andrews, the Manager of the Company.

The *Cottus Grænländicus* is admirably described in Richardson's "Zoology of British America," known as the Greenland Bullhead,—the Kaniok and Kaninok of the Greenlanders. The colours of the specimen here figured were extremely beautiful,—the shades of the head Vandyke brown, the deeper umber beautifully glazed over with a pinkish or violet tinge, the dorsal and above the lateral line more or less shaded,

and spotted towards the tail, and leaving a line of numerous papillæ or tubercles (altogether absent in *C. scorpius*) below the lateral line; large and irregularly formed white spots mark the sides, shaded around with deep carmine and a rich chocolate-brown, the tinge towards the belly passing into rich orange; the belly is also marked along the line to the tail with a row of roundish white spots; pectoral fins beautifully shaded and barred, spotted with white, the terminal portion and margins of a rich orange, resembling and emulating in beauty the rich colouring of the Tiger moth; irides of a deep golden yellow, tinged and marked with orange. The posterior portions of the rays of the pectoral and ventral fins are rough, with ciliated or minute spinous processes, which seem to be characteristic, and are not present in *C. scorpius* or *C. bubalis*, the rays in those species being smooth on both sides.

This beautiful fish was recorded in the "Proceedings" of the Society on the 1st of March, 1850, and was the only authentic record of its introduction into the Fauna of Great Britain.

The figures are drawn from life, on stone, by R. P. Williams, M.R.I.A.

RULES.

OBJECTS AND CONSTITUTION OF THE SOCIETY.

1. That this Society be called "THE NATURAL HISTORY SOCIETY OF DUBLIN," and have for its sole object the elucidation of the Natural History of Ireland.
2. The Society shall consist of Ordinary, Corresponding, Associate, and Honorary Members.
3. That the Officers of the Society shall consist of a President, four Vice-Presidents, two Secretaries, and a Treasurer; and that these, with thirteen other ordinary Members, shall constitute a Council.
4. The Officers, and other members of Council for each year, shall be elected at the Annual General Meeting; and should a vacancy occur by death, resignation, or otherwise, the Council may fill it, if considered desirable.
5. That the number of Members be unlimited.
6. That it shall be deemed sufficient service of any notice concerning the business of the Society to put it into the Post-office, directed to the residence of each Member, as registered on the books of the Society.

ADMISSION OF MEMBERS.

7. That the form for the election of Members of the Society shall be as follows:— Notice having been given to the Secretaries, they shall cause the names of the proposer and seconder, with the name and residence of the person proposed, to be posted in a conspicuous place where the Society meets, for a fortnight at least before the election. That each Member pay an admission fee of £1.
8. That the election shall take place (provided fifteen Members be present) at the ordinary meeting each month, by ballot; and that one black bean to seven white shall exclude.
9. That the Annual Subscription be £1, payable in advance on the 1st of November in each year.
10. That before any gentleman be balloted for as Member of the Society, the Treasurer shall certify that the subscription of such person has been lodged with him.
11. That no gentleman proposed as Member be allowed the privilege of voting or attending the meeting as a Member on the night of ballot.
12. The Secretary shall furnish to each Member, on his election, notice thereof.
13. That at the succeeding meeting (if resident in Dublin) he be introduced by the Secretary to the Chairman, who shall declare before the meeting that he has been duly elected a Member of the Society. He shall in the first instance sign a book declaring his compliance with the Regulations of the Society.
14. That Donors of the approved value of £20 in specimens of Natural History, Books, &c., to the Society, or on payment of £10 to the Treasurer, shall become Members for life.
15. That all Admission Fees and Life-compositions be invested in an approved security; and that the interest only of such investment be applicable to the expenses of the Society.
16. Associate Members shall be resident in Dublin, and eligible for election at the ordinary meetings by vote of the Society, on the previous recommendation of Council. Undergraduates of the University, being *ipso facto* eligible for proposal as candidates, they shall pay a subscription of 5s. annually, and be entitled to attend the meetings of the Society and to the Volume of ordinary Transactions for the current year.
17. Honorary and Corresponding Members may be elected by a vote of the Society at any of its ordinary meetings, on the previous recommendation of Council; and that for the future no person residing in Dublin, or within ten miles of it, can be elected as Hono-

rary or Corresponding Member of the Society. Corresponding Members resident in Dublin two months in one Session, and attending the meetings, shall pay as Associates for that year.

18. Corresponding Members, on the payment of 5s. each year in advance, shall be entitled to receive the Monthly Report of the Meetings, and to the Volume of Transactions at the end of each year.

19. Any Annual Member who shall not pay his subscription within three calendar months after it becomes due, or within such further time as the Council may allow, shall cease to be a Member, and his name erased from the printed list of Members.

OFFICERS.

PRESIDENT.

20. That in the absence of the President and Vice-Presidents, the Presidency go through the Council in rotation, alphabetically, on each evening of the meeting.

SECRETARIES.

21. It shall be the duty of the Secretaries,—

1st. To attend the meetings of the Society and Council, and to enter the Minutes of the proceedings at each meeting in a book kept for that purpose.

2nd. At each meeting to read aloud the Minutes of the preceding meeting.

3rd. At the ordinary meetings to announce the presents and donations to the Society since the last meeting, and to read aloud such papers or letters as the Council shall direct.

4th. To conduct the correspondence of the Society.

5th. To prepare a report of the proceedings and state of the affairs of the Society during each year, to be read aloud at the Annual General Meeting.

TREASURER.

22. It shall be the duty of the Treasurer,—

1st. To collect and receive for the Society all donations and subscriptions, and enter them in a book.

2nd. To furnish an account to the Society at the Annual General Meeting of the receipts and expenditure of the preceding year.

3rd. To report the state of the accounts of the Society when called for by the Council.

4th. No money shall be paid by the Treasurer, except upon a written order of Council, signed by the Chairman and one of the Secretaries.

COUNCIL.

23. That three Members at least of the Council shall go out at each annual election; that those Members who have attended the least number of times shall go out first, but shall be eligible to be re-elected.

24. That the Council shall meet from time to time, as it shall deem expedient for the interests of the Society.

25. Five Members, including the Chairman, shall be a quorum. The chair at Council shall be taken as at ordinary meetings.

26. It shall be the duty of the Council to superintend all the affairs of the Society.

27. The Council may authorize the lending of any books, &c., to any members under such regulations and conditions as it may think expedient; and may exchange or dispose of duplicate specimens belonging to the Society.

ORDINARY MEETINGS.

28. That the Society shall meet on the evening of the first Friday in each month, from November to June inclusive, at the hour of 8 o'clock, the chair to be taken at a

quarter past 8 precisely; and that it shall be in the power of the Council to call a General Meeting of the Society at any time it may be expedient to do so.

29. That the order of business for each night of proceeding be as follows:—

1st. The Secretary shall read aloud the Minutes of the preceding meeting, and the Chairman shall sign them.

2nd. The presents and donations to the Society shall be announced and exhibited.

3rd. Papers for the night shall be announced and read.

4th. That the reading of no paper occupy more than half an hour, except by the consent of the meeting.

5th. That the Members present shall then be invited by the President to deliver their opinions on the papers which have been read, and on the specimens which may have been exhibited at the meeting.

6th. That the private business of the Society, which is to be discussed at the ordinary meetings, shall be transacted after the communications of the evening have been read, and that all strangers and visitors be requested to withdraw.

30. All questions shall be decided by a majority. When the numbers are equal, the Chairman shall have a casting voice.

31. Each Member shall have the privilege of introducing *one* visitor to the ordinary meetings, provided he writes the name of the visitor in a book to be kept for that purpose.

32. Any Members wishing to propose or alter a Regulation of the Society shall give notice at one of the ordinary meetings, and it shall be discussed and decided at the next ordinary meeting of the Society; and the Secretary shall cause a copy of such notice to be posted in a conspicuous part of the meeting-room of the Society, a fortnight at least before the next meeting.

33. That the Secretaries give notice in the summonses to Members for the ordinary meetings of any important questions to be discussed at that meeting.

ANNUAL GENERAL MEETING.

34. The Annual General Meeting shall be held in November in each year, for the purpose of electing Officers and Council for the ensuing year, and hearing the Annual Report of the proceedings and affairs of the Society.

35. The chair shall be taken at a quarter past eight precisely.

36. A list shall be prepared by the Council containing the names of such persons as they recommend to be elected for the ensuing year.

37. A Member wishing to remove any person from the list may strike out his name, and write in its place the name of the person he wishes to be elected in his stead.

38. A balloting-box shall be placed on the table, and, at the expiration of one hour, the Chairman shall announce the result of the ballot.

39. That in the ballot a majority of the votes shall decide.

40. During the progress of the ballot the Annual Report shall be read by one of the Secretaries.

41. The Chairman shall then put the question shall the Report be adopted.

PAPERS.

42. All Papers read at the meeting, unless previously otherwise stipulated, are to be considered the property of the Society.

43. That due notice shall be given, through the Secretaries, of all Papers intended to be read at the ordinary meetings of the Society, in order that they may be submitted to the Council for their approval.

44. No Paper shall be read at the meetings of the Society unless the Secretary shall have apprized the author of these Regulations, in case he shall not be a Member of the Society.

45. That each person reading a Paper to the Society shall furnish to the Secretaries, at the meeting, an abstract of his Paper for insertion on the Minutes, and for publication.

Address, "The Secretaries, Natural History Society, 212, Great Brunswick-street, Dublin."

LIST OF MEMBERS,

CORRECTED TO OCTOBER 31, 1857.

Errors to be communicated, by letter, to the Hon. Secretaries, 212, Great Brunswick-street.

‡ Have contributed to "Proceedings."

|| Corresponding Members entitled to "Proceedings," under By-law 18.

HONORARY.

Elected.

- 1854. 1. Alder, Joshua, F. L. S., *Newcastle-on-Tyne*.
- 1854. 2. Bell, Thomas, F. R. S., President of Linnean Society, *London*.
- 1846. 3. Berkeley, Rev. Miles, F. L. S., *Kingscliffe, Wandesforde*.
- 1838. 4. Crampton, Sir Philip, F. R. S., M. R. I. A., *Merriown-square*.
- 1853. 5. Gray, John Edward, LL. D., F. R. S., *British Museum, London*.
- 1846. 6. Hincks, Rev. Thomas Dix, D. D., *Belfast*.
- 1854. 7. Hooker, Sir Wm. J., K. H., *Royal Botanic Gardens, Kew*.
- 1841. 8. Jones, Thomas Rymer, F. R. S., *London*.
- 1841. 9. Lindley, John, F. R. S., F. L. S., &c., *London*.
- 1854. 10. Newman, Edward, F. L. S., *Queen's Road, Peckham, London*.
- 1854. 11. O'Kelly, M. J., *Rochestown House*.
- 1841. 12. Royle, Forbes, *King's College, London*.
- 1854. 13. Sabine, Colonel, F. R. S., &c., *London*.
- 1854. 14. Westwood, Jo., F. L. S., *Oxford*.

Elected or
rejoined.

LIFE MEMBERS.

- 1838. 1. ‡ Andrews, William, M. R. I. A., *Leinster-street*.
- 1840. 2. Borough, Sir E. R., Bart., M. R. I. A., 18, *Leinster-street*.
- 1845. 3. Hemphill, Robert, 3, *Great Clarence-street*.
- 1838. 4. Hill, Lord George A., *Ballygarr, Co. Donegal*.
- 1848. 5. Hone, Nathaniel, 1, *Fitzwilliam-square, East*.
- 1843. 6. King, J. W., *Dame-street*.
- 1853. 7. Maxwell, R. P., *Groomsfort*.
- 1848. 8. ‡ Montgomery, Robert John, *Hume-street*.
- 1840. 9. Pollock, George A., *Oatlands, Navan*.
- 1840. 10. Raye, Henry R., *Dunany Port, Castlebellingham*.
- 1847. 11. Renny, H., R. E., M. R. I. A.
- 1850. 12. Smith, George, *Baggot-street*.
- 1839. 13. Townsend, R. W.
- 1838. 14. Williams, R. P., M. R. I. A., 22, *Dame-street*.
- 1856. 15. Whitty, John Irwine, LL. D., C. E., 20, *Upper Fitzwilliam-street*.

ANNUAL MEMBERS.

Elected.

1839. 1.†Aldridge, John, M. D., M. R. I. A., *Sackville-street*.
 1838. 2.†Allman, George J., M. D., M. R. I. A., *Edinburgh*.
 1840. 3. Anderson, Joseph, *Bank of Ireland*.
 1852. 4. Barklie, Robert S., 106, *Lower Gardiner-street*.
 1840. 5. Barrington, Croker, 6, *Fitzwilliam-square, North*.
 1843. 6. Barrington, John, 202, *Great Britain-street*.
 1846. 7.†Bergin, Thomas J., 49, *Westland-row*.
 1851. 8. Brady, Francis W., 22, *Leeson-street*.
 1854. 9. Barton, Henry M., 5, *Foster-place*.
 1855. 10. Barton, John K., M. B., L. R. C. S. I., 37, *Kildare-street*.
 1855. 11. Birchall, Edwin, 27, *Eden-quay*.
 1857. 12. Boyle, Richard, *Upper Merrion-street*.
 1840. 13.†Callwell, Robert, M. R. I. A., 25, *Herbert-place*.
 1839. 14. Croker, Charles P., M. D., M. R. I. A., 7, *Merrion-square, West*.
 1854. 15.†Clermont, Lord, *Ravensdale Park, Flurrybridge*.
 1854. 16. Carte, Alexander, M. B., M. R. I. A., *Museum, Royal Dublin Society*.
 1853. 17. Clarendon, Thomas, *Great Brunswick-street*.
 1838. 18.†Dombrain, James R., 36, *Leeson-street*.
 1839. 19.†Dublin, His Grace the Archbishop of, *Palace, Stephen's-green*.
 1854. 20. Domville, Wm. Compton, *Thornhill, Bray*.
 1855. 21. Domville, Sir Charles Compton, Bart., 39, *Lower Gardiner-street*.
 1855. 22. Darley, Joseph Farran, 14, *Upper Leeson-street*.
 1856. 23.†Doyle, John B., *Sandymount*.
 1847. 24.†Ffennell, William J., *Spire-view, Rathgar*.
 1855. 25.†Frazer, William, M. D., *Stephen's-green*.
 1857. 26. Gyles, A. M'Gwire, *Sander's-court, Kyle, Enniscorthy*.
 1843. 27. Gordon, Samuel, M. D., M. R. I. A., *Hume-street*.
 1844. 28. Griffith, Richard, LL D., M. R. I. A., F. G. S. L., &c., 2, *Fitzwilliam-place*.
 1855. 29.†Galbraith, Rev. J. A., F. T. C. D., M. R. I. A., 8, *Trinity College*.
 1857. 30. Haliday, A. H., M. R. I. A., F. L. S., *Harcourt-street*.
 1849. 31.†Hart, John, M. D.
 1844. 32.†Harvey, Professor Wm. Henry, M. D., M. R. I. A., F. L. S., 40, *College*.
 1839. 33. Hutton, Thomas, *Summer-hill*.
 1854. 34.†Haughton, James, 28, *City-quay*.
 1855. 35.†Haughton, Rev. Professor, F. T. C. D., M. R. I. A., 40, *College*.
 1855. 36. Horner, H. C., *Bachelor's-walk*.
 1855. 37. Halpin, George, *Ballast Office*.
 1857. 38. Hamilton, John, *Nelson-street*.
 1857. 39. Hamilton, Edward, M. D., 8, *Stephen's-green*.
 1853. 40. Jeffers, P. D., *Pembroke-road*.
 1851. 41.†Kinahan, Professor John Robert, M. B., M. R. I. A., *Sea-view Terrace, Donnybrook*.
 1855. 42. Kift, Thomas, 68, *Eccles-street*.
 1855. 43. Lees, Cathcart, M. D., 17, *Lower Fitzwilliam-street*.
 1854. 44. Martin, J. E., *North-wall*.
 1855. 45. Mathews, Edward, 31, *Lower Gardiner-street*.
 1856. 46. Millar, James E., *Leinster-street*.
 1857. 47. Mitchell, Arthur, M. D., *Stephen's-green*.
 1854. 48. M'Dougall, William, *Drumleek, Howth*.
 1857. 49. M'Nally, Vere Webb, *Old Mountpleasant, Ranelagh*.
 1851. 50. Nicholson, N. A., *Balruth, Kells*.
 1840. 51. Nugent, Daniel, *Denmark-street*.
 1856. 52. Nalty, John, M. D., *Clare-street*.
 1857. 53. Neligan, John Chute, *Tralee*.
 1841. 54. O'Hara, Major, C. K., *Annaghmore, Collooney*.
 1852. 55. Owens, G. B., M. D., *Kildare-street*.
 1855. 56. O'Reilly, J. W., *Westmoreland-street*.

Elected.

1856. 57. O'Meara, Rev. E., 57, *Great Brunswick-street*.
 1847. 58. Porter, George H., M. D., *Kildare-street*.
 1856. 59. Roberts, Robert, *Harcourt-terrace*.
 1848. 60. Stopford, James E., *Upper Merrion-street*.
 1854. 61. †Sanders, Gilbert, M. R. I. A., *Foster-place*.
 1855. 62. †Smith, Professor R. W., M. D., M. R. I. A., *Eccles-street*.
 1856. 63. Stokes, Professor, William, M. D., M. R. I. A., *Merrion-square*.
 1856. 64. Symes, Glascott, *Dame-street*.
 1856. 65. Stephens, H. C., *Adelaide-road*.
 1857. 66. Sargent, H. Johnstone, *Synnot-place*.
 1852. 67. Sutton, Frederick, *Harcourt-street*.
 1840. 68. Todhunter, Joseph, *College-green*.
 1854. 69. Talbot de Malahide, Lord, *Castle, Malahide*.
 1856. 70. Wilson, Thomas, Jun., *Upper Temple-street*.
 1852. 71. †Wynne, Right Hon. John, M. P., M. R. I. A., *Hazlewood, Sligo*.
 1854. 72. †Wright, E. Percival, A. B., M. R. I. A., *Museum, Trinity College*.
 1855. 73. West, Archdeacon, *Wilton-square*.
 1856. 74. Wilde, W. R., M. D., M. R. I. A., *Merrion-square*.
 1855. 75. Yeates, George, M. R. I. A., *Grafton-street*.

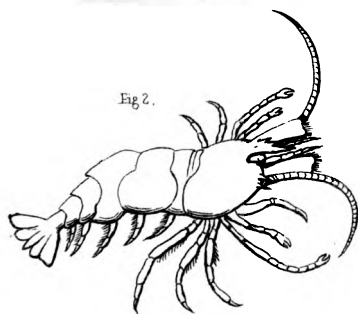
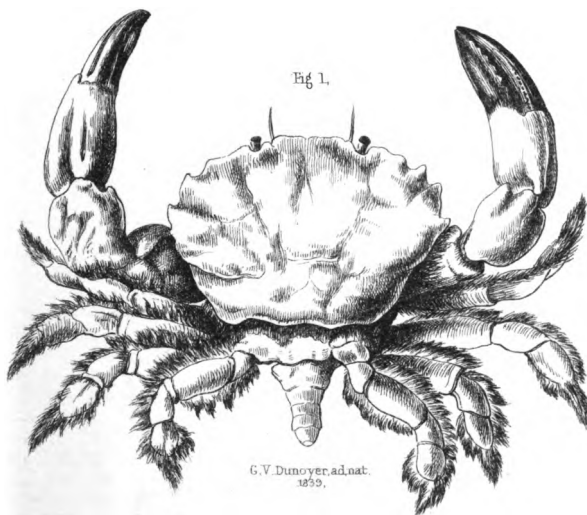
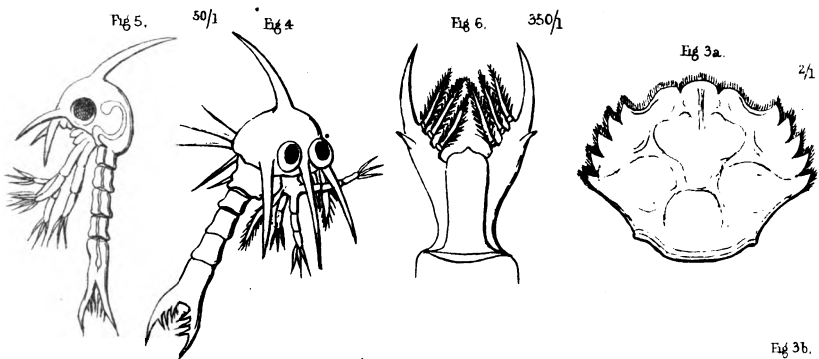
ASSOCIATE MEMBERS.

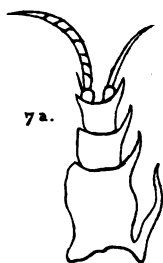
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 1855. 2. Byron, Ryland, *Dublin*.
 1857. 3. Green, Joseph Reay, 5, *College*.
 1848. 4. †O'Mahony, Rev. Thaddeus, 24, *College*.
 1855. 5. Sutherland, Daniel.

CORRESPONDING MEMBERS.

1841. 1. †Du Noyer, George V., M. R. I. A., G. S. I., 51, *Stephen's-green*.
 1856. 2. Emerson, Rev. J. M., *Ballylinan, Athy*.
 1857. 3. Foot, Frederick, G. S. I.
 1857. 4. †Kinahan, George Henry, C. E., T. C. D., G. S. I., 51, *Stephen's-green*.
 1857. 5. †Kennedy, William, *Rathkeale*.
 1841. 6. Hassall, A. H., F. L. S., *London*.
 1844. 7. Hincks, Rev. Thomas, *Warrington*.
 1857. 8. Lecky, W., *Valentia Island*.
 1852. 9. Lowe, Edward J., F.R.A.S., *Nottingham*.
 1840. 10. Neligan, Dr., *Patrick-street, Cork*.
 1857. 11. O'Kelly, Joseph, A. B., C. E., T. C. D., G. S. I., 51, *Stephen's-green*.
 1857. 12. Wynne, A. B., G. S. I., 51, *Stephen's-green*.
 1847. 13. Wilson, Robert, Lieutenant, R. N., *Cape Clear Island*.

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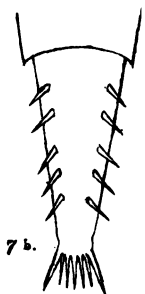




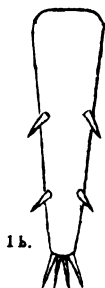
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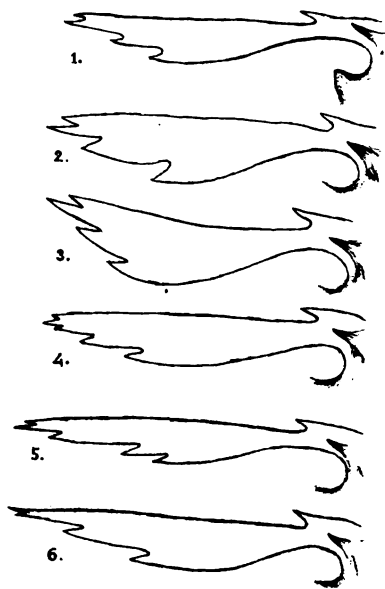
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7b.



1b.



1.

2.

3.

4.

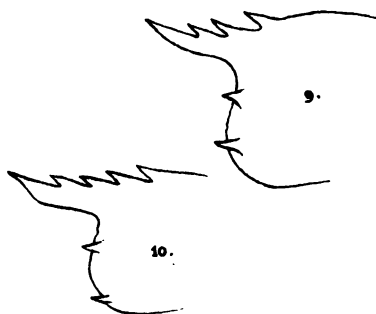
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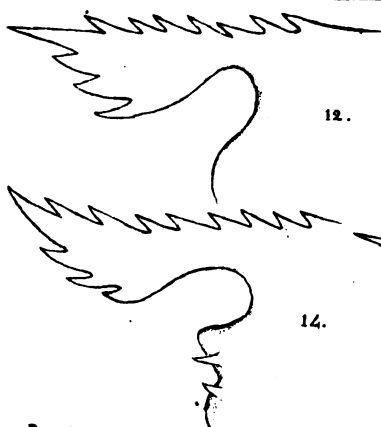
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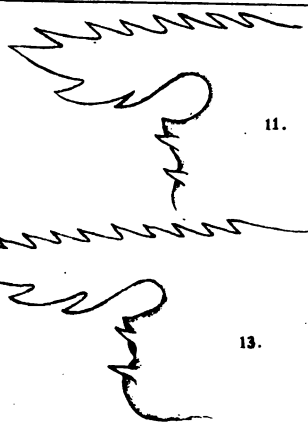
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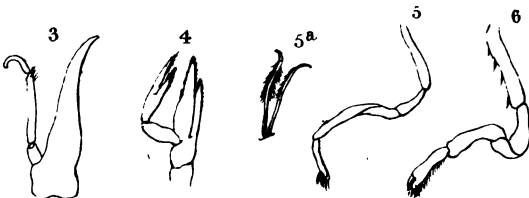
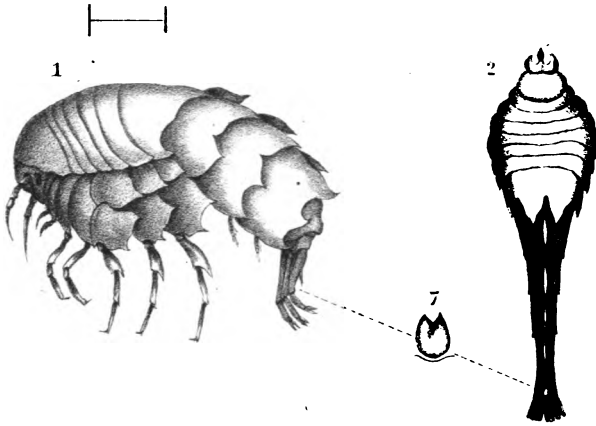
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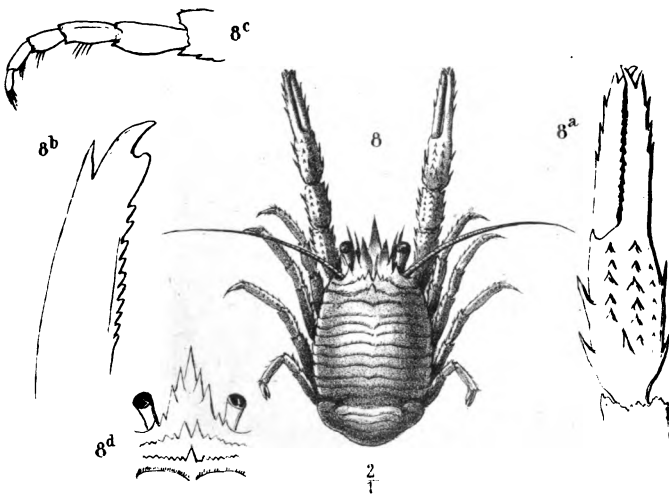
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13.

R. ad nat.

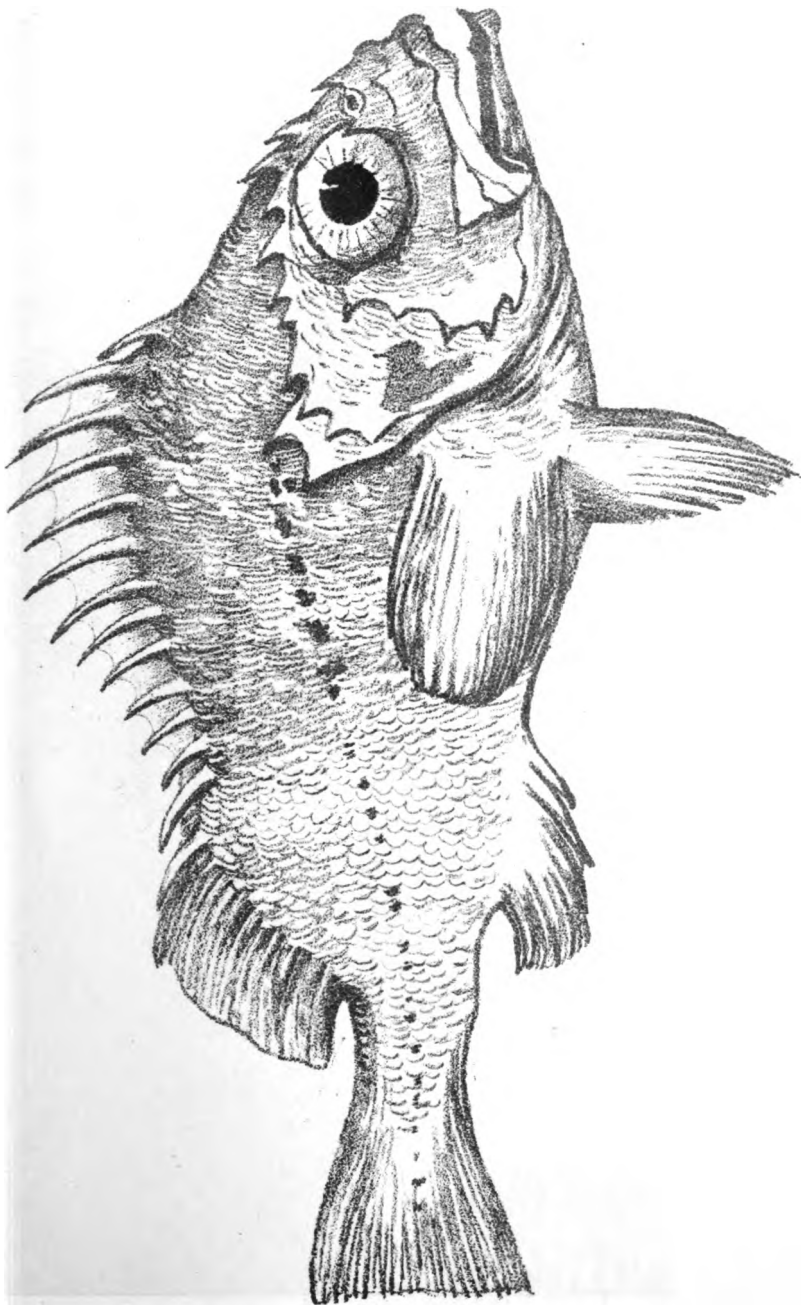


C. Spongia Brachy ad. nat.



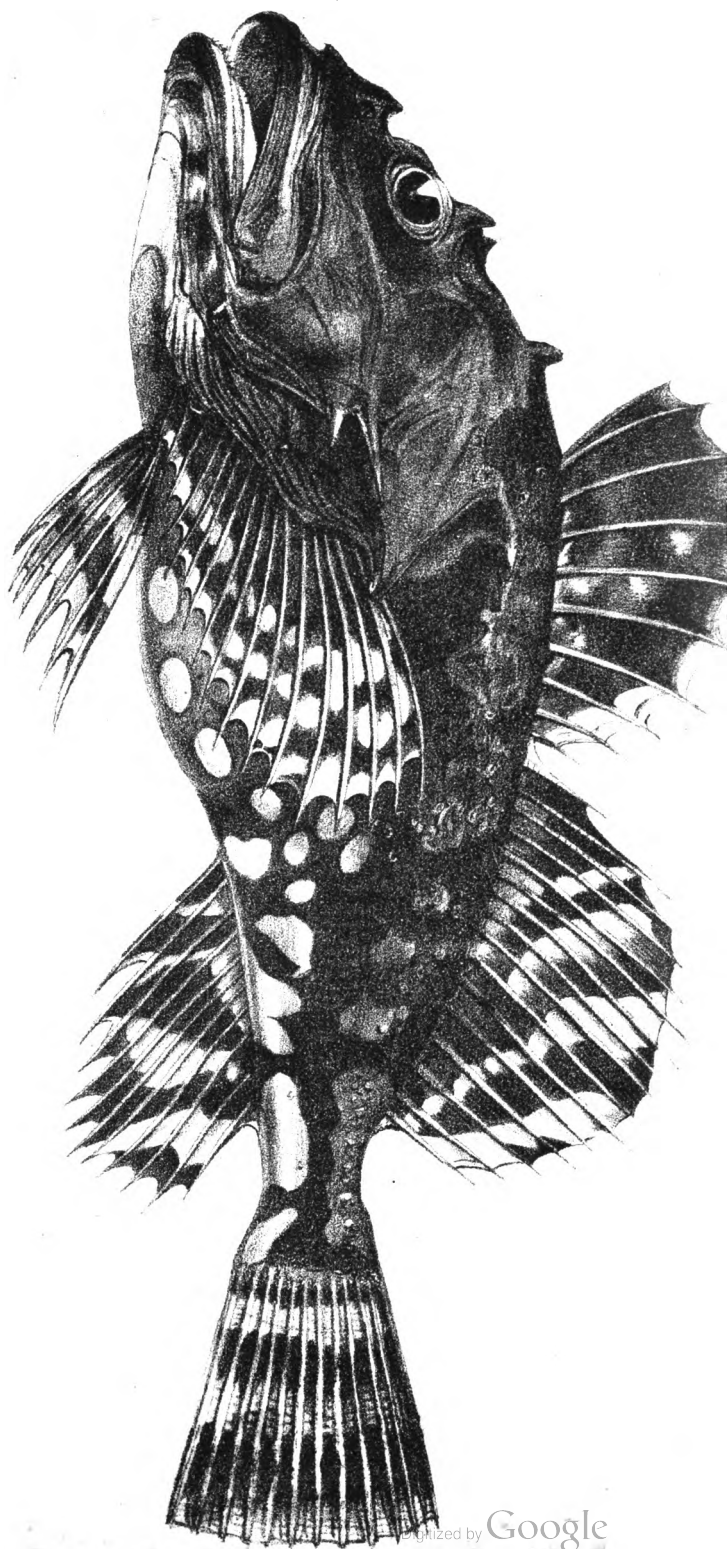
R. ad. nat.

Forster & G. Dübner.



NORWAY HADDOCK, SEBASTES NORVEGICUS

Scorpaenidae



A R E V I E W
OF THE
GENERA OF TERRESTRIAL ISOPODA
(ONISCOIDEA):

WITH
DESCRIPTIONS OF ALL THE KNOWN BRITISH SPECIES
AND GENERA.

BY
JOHN ROBERT KINAHAN, M.B. T.C.D., M.R.I.A.,
PROFESSOR OF ZOOLOGY, DEPARTMENT OF SCIENCE AND ART;
HON. SEC. DUBLIN NAT. HIST. SOCIETY;
ETC. ETC.

With Four Plates.

Read before Section D, BRITISH ASSOCIATION, August 26, 1857.

PRIVATELY PRINTED FOR THE AUTHOR, AND PRESENTED TO THE MEMBERS OF THE
NATURAL HISTORY SOCIETY OF DUBLIN.

DUBLIN:
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BY M. H. GILL.
1857.

[Reprinted from the *Natural History Review*, Vol. IV. for 1857.]

A REVIEW,

&c. &c.

HAVING been during the past summer engaged in researches among the Irish Isopoda, I am induced to lay before your Association the results to which I have been led by an examination of the above genera,—the rather, as from authors this interesting family has received but little attention, and in consequence but little is known with certainty concerning the habits, species, and distribution of the group. This is the more remarkable, as of the fourteen species now to be noticed, all, with the exception of two, are of extremely common occurrence, and their study, owing to their size, comparatively easy. In proof of this statement I may mention that all except two (one a marine species) have occurred to me in a garden not sixty yards square, and nearly all in abundance.

It would appear to have been the fashion with carcinologists (probably on account of the terrestrial habits of most of the genera), to nearly ignore their existence, and hence the mistakes with which the authorities abound. This renders a brief sketch of the bibliography of the group necessary.

Historical Bibliography.

Although a host of writers have from the earliest days of science noticed these animals, yet the true nature of their generic, specific, and familiar relations have been so totally misunderstood, and the characters drawn on for diagnosis are of so little real value, that we may pass over the labours of the majority of authors, and come at once to the works published within the last twenty years, the rather as this part of the subject has been so ably treated of by Professor A. Lereboullet in the "*Transactions of the Strasbourg Society*," just now to be referred to.

Passing, therefore, over the writings of Linnæus, Geoffroy, Fabricius, De Geer, Cuvier, Leach, Dumeril, Latreille, Risso, Savigny, and a host of others, whose characters, drawn from colour chiefly, render

their descriptions worse than useless, we will come to Brandt, who appears to have caught at the true distinctive characters of form, and may be said to have laid the first foundation of a perfectly natural system, in his "Conspetus Monographiæ Crustaceorum Oniscodorum," published in Moscow in 1833; and although in some instances he has stopped short in his analysis, and has even mistaken the true import of some of the characters, yet it must be a matter of regret that this naturalist has not yet fulfilled his promise by giving to the world a full history of the group.

Milne-Edwards, who comes next in order of time, has scarcely in this sustained his well-deserved reputation in other groups, as this part of his work is replete with errors of a serious nature, and the descriptions, many of them copied verbatim from the earlier writers, and mere accounts of colours, are useless. Witness the description of *Philoscia muscorum*, a genus which he can scarcely have examined, or he would not have proposed that it should be reunited to *Oniscus*, a genus from which, as we shall see, it differs widely.

In the fourth volume of the "Memoirs of the Natural History Society of Strasbourg," published in 1853, appears a paper from the pen of Professor A. Lereboullet, M. D., Director of the Museum at Strasbourg, entitled, "Sur les Crustacés de la Famille des Cloportides qui habitent les Environs de Strasbourg," of which it is impossible to speak in too high terms, whether we regard the minuteness of details, or the author's patient investigations into the labours of others, and although in one or two points he has evidently fallen into error, yet, as a whole, this little work must be long looked on as a standard on the subject.

I must here also notice an excellent, but scarce little work, which has but recently come into my hands, and for the perusal of which I have to thank the kindness of A. H. Haliday, Esq., entitled, "Prodrômus Synopsos Crustaceorum Prussicorum," published at Königsburg, 1834, from the pen of E. G. Zaddach, Ph. D., which contains much useful matter; among other things, M. Edward's error concerning *Philoscia* is noticed.

Dana in his splendid work on the Crustacea, has proposed in some respects a new arrangement of the group, but has, as I think, mistaken in some cases the bearings of the characters, as will be shown further on.

Valuable notices of separate genera and species have appeared as detached papers in some of the journals, chiefly German (as, for instance, the description of the curious genus, *Titanethes albus* of Schiödte (*Pharusia alba*, Koch), in Schiödte's interesting account of the subterranean Fauna of Carniola), which have thrown much light on the true affinities of these animals, and render a revision of our classification necessary.

It will be necessary to glance at the systems of classifications adopted by the several authors mentioned; but first I must notice a most elaborate, as far as illustrations go at least, work by Henrich Schæffer, intended as a supplement to Koch's "Fauna Germanica." In this work we have spurious species multiplied to a most inconvenient extent, and his ge-

nera are most of them too large : thus, under *Ligia* he includes *Philoscia muscorum* (figured as *Ligia melanocephala*, a more natural alliance, by the way, than M. Edwards, of *Oniscus*). *Itea* includes *Itea* proper and *Platyarthus* (*Br.*), and probably a third form. He has changed Brandt's name, *Ligidium*, for *Zia*, and his *Armadillo* into *Penthetus*, whilst *Armadillium* (*Br.*) figures here as *Armadillo*, Latr. The other genera described by him are *Phærusa*, *Oniscus*, and *Porcellio*, the two latter including as species many which can scarcely be looked on as even varieties.

On Classification.

Brandt, taking as familiar characters the number of joints in the terminal appendages of the antennæ and the number of pairs of caudal appendages (i. e. the last pair of false feet), has divided the genera known to him into two sections, viz., *Ligiea* (*Ligia* and *Ligidium*) and *Oniscinea*, subdivided according to the length, form, and insertion of the exterior caudal appendages, into (1) *Porcellionea* (*Trichoniscus*, *Platyarthus*, *Porcellio*, *Philoscia*) ; and (2) *Armadillinea* (*Armadillidium*, *Cubaris*, *Armadillo*, and *Diploexochus*).

Although these generic groups are natural enough, he appears to have mistaken the true nature of the caudal appendages, which in all the genera belonging to this group consists truly of two pairs, as we hope to show when we come to treat more in detail of them, although in all the groups except *Ligiea* their true nature is somewhat obscured by the truncation of the margin of the peduncle. In *Ligidium*, included by him among the *Ligiea*, but which, as will be seen, we propose to place in a separate division, the appendages are really two pairs.

His lesser divisions and species are many of them faulty, being governed nearly entirely by considerations of number and colour, characters of a very minor importance in classification, though oftentimes convenient when conjoined with the more permanent characters, of form, position, and structure. Some of his genera probably must fall, at least in their present shape, their descriptions being so imperfect as to render them unrecognisable, owing to his imperfect means of observation : thus, *Trichoniscus* may possibly turn out to be *Itea*, *Zia*, or some of their allied genera, more fully described by later writers.

Milne-Edwards has for the most part copied Brandt, but has proposed new primary divisions, in the naming of which he has been singularly infelicitous. He has drawn his familiar characters from the comparative length or brevity of the last false feet, as compared with the terminal segment of the abdomen, and thus makes two primary groups, *Cloportides maritimes* (*Ligia* and *Ligidium*) : and *Cloportides terrestres*, subdivided, according to the form and length of the last pairs of false feet and their appendages, into *Porcellioniens* (*Oniscus*, *Philoscia*, *Deto*, *Porcellio*, *Trichoniscus*, *Platyarthus*), *Armadilliens* (*Armadillidium*, *Armadillo* (includes *Cubaris*), *Diploexochus*), and *Tylosiens* (*Tylus*).

The names of his primary divisions show us the danger of naming groups from habits. *Ligidium*, although included among the Maritime

woodlice, is as truly a terrestrial species, and found at as great a distance from sea, as *Porcellio* itself. Most of his descriptions of genera are avowedly mere transcripts from previous authors, even those which one would suppose ought to have come under his own notice, being indigenous, as in the case of *Philoscia*, which he allies to *Oniscus*, whereas in truth it is much more closely allied to *Ligia* in all its characters. His specific descriptions are almost all mere details of colour, without one truly distinctive character.

Dana has much extended the group, uniting, however, to the genera already mentioned others, whose claim to the alliance appears but slight, viz., the *Limnoriæ* and *Asellidæ*, on account of the characters of the posterior pair of abdominal appendages. He has thus made one large group, *Oniscoidea*, and in his definitions has largely entered into characters which may be generic.

He divides the *Oniscoidea* into three groups, according to the mode of articulation of the body; the number of articulations of the abdomen; the size of the last abdominal segment; the length of the caudal appendages (i. e. the last false feet); the absence or presence of a palp to the mandibles; and the number of articulations and size of the internal antennæ. (Of these, the characters of the number of articulations in the abdomen and internal antennæ, the size of last abdominal segment, presence of a palp to the mandibles, have reference solely to his last family (*Asellidæ*), a group which had been probably better omitted.) 1. *Armadillidæ*, according to arrangement of caudal appendages, divided into *Tylinæ* (*Tylus*), and *Armadillinæ* (*Armadillo*, *Sphærillo*, *Armadillidium*, *Diploexochus*). 2. *Oniscidæ*, according to number and form of articulations of maxilliped, form of articulation of fifth joint of external antennæ, and form of peduncle and styles of caudal appendages, divided into *Oniscinæ*, *Oniscus* (including as sub-genera *Trichoniscus*, *Porcellio*, *Oniscus*). *Philoscia*; *Platyarthus*; *Deto*. *Scyphacinæ* (*Scyphax*, *Styloniscus*). *Liginæ* (*Ligia*, *Ligidium*). 3. *Asellidæ*, including *Limnoriæ* (*Limnoria*). *Asellinæ* (*Jæra*, *Jæridina*, *Asellus*, *Janira*, *Henopomus*, *Munna*). As I believe these last do not really belong to this group, I omit their characters.

Although this classification contains some new characters, many genera are omitted, which naturally belong to the group, and many of the characters are too artificial to be taken into account. The innovation of considering *Porcellio*, *Oniscus*, and *Trichoniscus* as sub-genera is highly objectionable (indeed it will be well when the term sub-genus is banished altogether from our nomenclature), as these divisions do not depend, as he seems to assert, on the mere number of joints in the terminal filament of the antennæ, but, as I hope to prove, on a number of other characters sufficient to constitute them, as real genera as *Ligia* and *Ligidium*. Mere number plays too great a part in his system also to allow of natural groupings. His classification, however, is valuable as restoring to their proper place the *Armadillidæ*, which, on account of their resemblance to certain *Myriapodæ*, have been hitherto, as it seems, unjustly degraded to the bottom of the list of *Cloportides*.

From a revision of these various systems, it appears, that putting out of sight such arbitrary characters as mere colour and number, divisional characters of most importance are: the comparative development of the external antennæ or rather of its filament; the mode of insertion and development of the last pair of abdominal feet, and perhaps we may add the form of the maxilliped; this last, however, is a character so difficult of application that it were, perhaps, as well to leave it out. Two very important sets of characters have been omitted or overlooked, which must be taken into account in any classification which seeks to form natural groups; these are,—the characters drawn from the form of the head; and from the *epimerals*, as they are generally called. These characters, being permanent in their structure, presenting differences easily caught at, and running also in parallel arrangement throughout the groups, I would propose as the basis of the classification, which, till a better shall arise, I would suggest as that which appears most natural and most in accordance with homological affinities.

The characters, then, which must be considered in detail are:—

1st. The amount of development of the so-called “epimerals” or *coxæ* of the posterior or cephalo-thoracic and abdominal appendages.

2nd. The form of the head as regards the absence or presence of what are called the frontal or median, and lateral lobes.

3rd. The relative structure and development of the antennæ, and especially of the terminal filament, or, as we will call it, “*the tige*” of the external or superior antennæ.

4th. The structure and position of the last pair of abdominal false feet, their relations to each other and the last abdominal ring.

Before entering on these, the following nomenclature of parts must be stated:—*Head*: all the parts anterior to and including the first ring, or, in other words, the homologue of the carapace of the Brachyura. The term *cephalo-thoracic* refers to the portion of the body included between this point and the posterior border of the eighth ring, counting the head the first: this homologizes, we believe, with the pereon of Spence Bate; while the remaining six rings are referred to as the *abdomen*, homologizing with the abdomen of the Brachyura, and the pleon and telson of Spence Bate. The appendages attached to the last abdominal ring are cited as the last pair of abdominal feet, for such is evidently their nature; the so-called epimerals stand as *coxæ*, and the filament of the antennæ as *tige*.

I.—Amount of Development of the “Epimerals.”

The “epimerals” first claim our attention. For the determination of the true homological relations of these we are indebted to the researches of C. Spence Bate, F.L.S., among the Amphipoda, who, in the first Part of his Report on the British Edriophthalmia, published in the Report of the British Association for 1855, has proved most conclusively that these so-called epimerals are truly and homologically the first joint, or, as he calls them, the *coxæ* of the ambulatory and swimming organs; and although, in the case of the posterior pairs of appendages in the

Isopods under consideration, their true nature, when present, is oftentimes obscured, yet, by a little care in the examination, it may be at once seen, though somewhat disguised.

Their presence in the cephalo-thoracic rings seems to be constant in all the genera I have examined, or of which detailed accounts are extant; though sometimes, as in *Ligidium*, the suture which divides them from the edge of the true epimerals is so faintly marked as not to be appreciable; hence I suspect that Lereboullet laboured under an error in supposing them absent in *Ligidium Perseoni*, for an examination of his own figures of the articulation of the ambulatory legs shows that they must be present, from the position of the articulation of the first joint, which arises from beneath a ledge which evidently is the coxæ of the limb: it is hazardous to speak positively on this point without an examination of specimens, but in *Armadillium*, *Ligia*, *Philoscia*, *Philougria*, *Porcellio*, and *Oniscus*, I find them well marked, and they are figured or recorded in *Itea*, *Titanethes*, *Tylus*, and several other genera. In the abdominal segments there may be some question of their presence, but what are usually called the posterior angles of the rings a very little examination shows really to be these coxæ. This is remarkably well seen in *Ligia*, and, judging from Dana's figures in *Tylus* above all, where they appear to be regularly articulated to the rings in the eight, i. e. the first abdominal segment. Dana appears to have overlooked this character altogether; there is some great confusion in his figures: many of the species certainly are not belonging to the genera to which he has referred them,—I may instance *Oniscus nigrescens*, *O. maculatus*, and *O. pubescens*, which are most certainly not *Oniscus*, but most probably *Philoscia* judging from the figures of the false feet.

An additional evidence of the true nature of these posterior angles is afforded by the mode of articulation of the posterior false feet, which is, in some of the genera, by means of a regular ball and socket joint.

Regarding their development in the abdominal segment (i. e. the *pleon* and *teleon* of Spence Bate), we find the following types:—

1. Coxæ present in both cephalo-thoracic and abdominal segments, and of nearly equal proportional development. This includes *Ligia*, *Tylus*.

2. Coxæ present in first five abdominal rings only, two types.

- (a) Narrow, so that abdomen is much narrower than last cephalo-thoracic ring. The coxæ of first and second abdominal segments concealed beneath last cephalo-thoracic segments. The third ring of the abdomen much wider than the second —; this reaches its limits in *Titanethes*. This type includes *Ligidium*, *Titanethes*, *Philoscia*, and perhaps Dana's new genus, *Scyphax*.

- (b) Coxæ present as before, but extremely narrow, and not concealed beneath cephalo-thoracic rings. This includes *Itea* (?), *Philougria*, and probably *Trichoniscus*, and *Deto*.

3. Coxæ present in third, fourth, and fifth segments. In the first and second segments the coxæ, if developed, are so linear as not to be recognisable. This includes *Porcellio*, *Oniscus*, and probably *Platyar-*

thus. *Sceyphax* also, judging from the figures, belongs to here; it may, however, form a distinct type, as the coxæ of the second appears to be developed. The animal figured by Dana as the young of this genus can scarcely be so, unless it be an exception to all the rules which regulate the form of the young in this family. He has himself proposed to call it *Actæcia*.

4. Coxæ present in second, third, fourth, and fifth rings, the sixth reduced to its minimum: *Armadillo*, *Sphærillo*.

II.—*The Form of the Head.*

We shall next examine the arrangement of the various parts of the cephalic segment, or, as I have called it, the *head*; these are of minor importance, but still assist much in classification. It will be necessary to examine the native genera in detail.

Ligia, Plate XX., Figs. 7 to 10.

When the head is looked down on from the front, we remark anteriorly just beneath but not attaining to the frontal line of the head, a broad plate extending over the *entire* forehead, and divided transversely by a raised ridge; its superior margin also marked by a raised ridge. This superior ridge passes off on each side beneath the eyes, forming at least a third of the inferior border of the orbit. The external angle of the orbit, however, is formed, not by this, but by the cephalic ring continued forwards from behind, and terminating as a rounded knob just above the external antennæ; these arise in the angle between the inferior border of the frontal plate and the projecting lobes. The inferior border of the frontal plate is formed of two curves, convex upwards, one over the origin of each external antennæ; the angle of their junction is truncate, separated by a short transverse suture from a small, narrow, somewhat quadrilateral plate, which bears the internal antennæ, and is probably the remains of the second or internal antennary ring, the frontal plate itself representing the external antennary or third ring of the typical crustacean; beneath this is a broad, well-marked plate, the epistome.

Philoscia. Plate XX., Figs. 1 to 6.

The inferior border of the frontal ring is nearly straight across, the transverse suture well marked, nearly on a level with the superior margin of the external antennæ, its superior margin curved, raised, and passing slightly beyond the frontal line of the cephalic segment, shutting out the orbit from the insertion of the external antennæ, and a deep sulcus separating it from the external angle of the orbit, the third ring being thus transverse and narrow. The second ring is nearly as deep as the third, and well marked; the epistomal plate narrow, and formed of two triangles placed apex to apex. The orbits are open below and behind.

Philougria. Plate XXI., Figs. 1 to 4.

Nearly a similiary arrangement prevails, but the lateral ridges around the insertion of the external antennæ are somewhat more strongly marked.

Oniscus. Plate XXI., Figs. 5 to 7.

The external angles of the superior margin of the third ring are produced into a broad lobe, which covers over the origin of the external antennæ, it is then continued across, projecting slightly over the frontal line of the cephalic segment; the transverse suture is well marked. The second ring very narrow, almost obsolete. The lateral lobes are continued backwards, and are separated by a suture from the external inferior border of the cephalic segment, which completes the orbits.

Porcellio. Plate XIX., Figs. 1 to 10.

External angles of third antennary segment still more developed, the superior margin raised into a lobe which projects above the frontal line of the cephalic segment, and gives the head a trilobed appearance. This lobe, though sometimes badly marked, *Porcellio pruinosus* (Br.), *P. frontalis* (Lereb., not Edw.), for example, is present in all the species I have had an opportunity of examining.

Armadillium. Plate XXI., Fig. 3.

The eyes are supported on the cephalic segment alone, the margin of this is raised, forming an angular projection in the middle of the forehead, passing back from whence, as before stated, it forms the orbital margin, to the entire exclusion of the third segment, the lateral lobes here being remarkably small, and derived entirely from the cephalic segment.

The superior margin of the third ring commences beneath the lateral lobes of the cephalic segment, a suture marking its origin, and the margin of cephalic border concealing it, thence it gradually emerges, passing inwards, and rises above the frontal border as a prominent arched plate, which projects over the frontal line, and is visible from behind.

Its surface presents the following markings, beginning below :—In the centre, arising from the transversal suture which divides the second and third segments, two divergent ridges passing out on each side, terminate at the extremities of the arched superior margin; external to each of these is a deep sulcus; bounding the outer edge of this sulcus a curved raised ridge surrounds the insertion of each external antennæ, and terminates as a large lobe on the outer side of the head; these are the lobes which are described by authors as the lateral lobes in the *Armadillinae*, and which differ from the lateral lobes of the *Oniscinae* in the place of their origin being from the inferior, not superior, margin of third ring.

The second ring is well marked, transversal, and prolonged on each side into a trigonal point beneath the external antennæ, the lobes bearing the internal antennæ on their summits. When at rest the external

antennæ lie buried within this sulcus, curled over between the lateral lobes of the third and fourth, or cephalic, segments.

We have then the following rings represented: the first antennary (i. e. second normal ring); the second antennary (third normal). As to the first (or ophthalmic) ring, it scarcely seems to exist; what I have called the lobes of the superior ridge may represent it, but I think rather they are the epimerals of the third ring.

Of these parts the most important to be attended to are: the median lobe, formed, as we see in Porcellio, by the *superior* margin of the third or external antennary ring: and the lateral lobes, formed in Oniscus and Porcellio by the superior margin of the same ring, and in Armadillium by the inferior margin; for while undoubtedly generic in their characters, they also assist us materially, in conjunction with other characters, in the formation of families.

On analysis, then, we get the following types of cephalic characters in the groups:—

1. Head furnished with lateral lobes arising from *inferior* margin of third ring; median lobe arched, prominent, forming a triangular plate vertical to frontal line. Genera—Armadillium, Armadillo, Spherillo (?), Cubaris, Scyphax (?).

2. (a) Head furnished with lateral lobes arising from *superior* margin of third ring; median lobe prominent, in the same plane as the frontal line—Porcellio.

(b) Head furnished with lateral lobes, arising from the *superior* margin of the third ring, which is emarginate(?) in the centre—Oniscus.

3. The superior margin of third ring nearly straight, neither lateral nor median lobes, terminating externally at the external angle of orbits—Philoscia, Philougria, Itea (?).

Itea is described as having small lateral lobes.

4. The superior margin as in No. 3, but not rising above inferior border of orbits—Ligia, Ligidium (?).

There may be, and probably are, two other types at least, viz., that of Scyphax, and Titanethes, but I have only seen figures of these, the latter is described as having large lateral, but no median lobes.

These naturally lead us to consider the characters of the antennæ; and here we are dealing with organs whose importance has been to a certain extent recognised, though apparently neither has their full nor true bearing on classification been hitherto considered. The number of joints without any reference to the more important character of form, has been too much relied on, and hence some most incongruous groupings, as of Philoscia and Oniscus, have been made; but of this more anon: first, to consider their general structure:—

III. The Characters of the Antennæ.

First, of the *Internal antennæ*.—These are merely rudimentary through the entire group, generally consisting of but three short articulations (Porcellio has four), and seldom passing beyond the front. They

are inserted internal to, and at the base of, the external antennæ; they afford but little assistance in classification, for although they have been made use of to distinguish genera, in the higher divisions they are useless as diagnostic characters. We pass then to the next or—

External antennæ.—These are invariably simple, being made up of a peduncle, which is pretty constant in its characters, and a filament or tige, which varies much, and therefore affords good classificatory characters. The peduncle invariably, as far as we know, consists of five joints: in some, as *Ligia*, a sixth appears to exist, but a little examination will show this to be a part of the third ring. The only joint which affords any useful character is the second, which, in some genera, as *Armadillium*, *Porcellio*, and *Oniscus*, is narrow at its articulation with the first ring, and then suddenly swells out into a broad expanse, contracting again slightly towards its articulation with the third joint; while in others, as *Philoscia*, *Ligia*, *Philougria*, *Itea*, and *Ligidium*, the second joint is globular: another argument for the separation of *Philoscia* and *Oniscus*. The carvings and sulcations on the joints of the peduncle, however, occasionally afford useful specific characters.

From the extremity of the peduncle arises the filament, and of this, trusting to form alone, the seven following types have been described. This organ has attracted much attention; but unfortunately, as I said before, too much attention has been paid to mere number, and too little to form.

Regarding form only, we find the filament constructed on three types:—

1st. The articulations are short, globular, cupped at their upper extremities, which are fringed with hairs, and receive the inferior portion of the articulation next succeeding. These filaments are all, as far as I can learn, multi-articulate. Examples—*Ligia*, *Ligidium*, *Titanethes*, *Styloniscus*.

2nd. The articulations elongated, somewhat flattened, and generally covered with hair, few in number, gradually tapering, but not subulate, the terminal one terminating in a narrow articulated hair. Examples—*Oniscus*, *Porcellio*, *Philoscia* (?), *Armadillium*, *Armadillo*, *Spherillo*, *Tylus*, *Scyphax*, *Platyarthrus* (?), *Deto* (?).

The characters of the second articulation of the peduncle, as hinted above, divide these into two groups.

3rd. The articulations few in number, the whole filament gradually tapering, subulate, and perfectly naked, terminating in a tapering filament. Examples—*Philougria*, *Itea*, *Trichoniscus* (?).

In all these genera the number of joints in the antennæ has been used as a generic character by Brandt, &c., except *Ligia*, *Ligidium*, and *Platyarthrus*; but in grouping the genera no regard has been, as far as I know, paid to the far more important character—that of the form of the tige.

Dana states that number of articulations of the tige is of no value as a character, and instances as a proof it the genus *Scyphax*, in which he

states that in the young the tige has its apex with the rings half marked. From the character of the figure it is apparent the drawing was made from a dead specimen, probably a dried one, in which, owing to the contraction of the tissues, circular cracks had taken place, a fact which any microscopist who examines the antennæ of many of the Cloportides under the glass must be fully aware of. The specimen also which he figures as the young of *Scyphax*, judging from its tail appendage, can scarcely belong to that genus at all; at least, though I have carefully examined the young of all our native genera, most of them recently hatched, yet I never met an instance in which the tail appendages differed much from that of the full-grown animal: but we will speak of this anon in our enumeration of genera.

There is one objection which has been started to using the characters of the tige as generic, which must be noticed, i. e. that in the young the number of joints are less than in the adult. This statement is only partially true. For instance, in most of the genera in which the antennæ are multi-articulate, the antennæ of the young and adult differ much; but in those of the second and third types, given above, in some species there is no difference at all, the articulations being all present, though the terminal ones are much shorter than normal. This is the case, for instance, in very young *P. pruinosus* and *P. scaber*, even when the coxæ of the seventh cephalo-thoracic segments and the legs of the same pair are absent: and even where it holds good there can be no mistake, for other characters, such, for instance, as that noted above, the absence of the seventh coxæ, at once marks the animal as immature; hence I think Dana is wrong in making sub-genera of *Trichoniscus*, *Porcellio*, and *Oniscus*, merely because the number of joints in their antennæ have been too much dwelt on.

IV.—*Form and relations of the last abdominal ring and its appendages.*

Although the characters of these latter have been long employed in diagnosis, yet it would appear that their true homological value has neither been appreciated nor understood: for, although in all the genera of this group their presence has been recognised under the names of "*abdominal false feet*," "*caudal appendages*," and "*appendages of the last segment*," yet, as far as I am aware, the true relations subsisting between them and the so-called "*thoracic*" feet have been either overlooked or only hinted at.

Their structure in all the genera is pretty much the same: a broad basal joint, articulated somewhere at the termination of the last abdominal ring, and furnished (except, perhaps, in *Tylos*, which I have never seen) with a pair of dissimilar appendages, the external generally broad, the internal pointed and linear, and inserted above the external; or, to speak more correctly, an appendage of two or more articulated joints, the basal joint furnished at its inner side with an accessory appendage; that is, a foot, in which the second (the first being the posterior angle of the ring), third, and fourth, &c., articulations are present, the second, or ischium, being furnished with an appendage.

That this is the true nature of the organ appears from the following :—

1st. The mode and point of articulation of the peduncle (basis) with the last abdominal segment.

2nd. The mode of articulation of the so-called external appendage (ischium) and peduncle (basis).

3rd. The difference in form and relation between the internal (accessory filament) and external (ischium) appendages.

1st. The mode of articulation of the peduncle.

By reference to the observations on the so-called "epimerals and posterior angles of the abdominal rings," it will be seen that, taking into consideration the ultimate segment only, two principal types exist, viz., those in which "epimerals" or coxæ exist, as *Ligia*, and those in which these organs are absent, as *Oniscus*, *Porcellio*, and, perhaps, *Philoscia*, &c.

Now, if we examine these, we will find that the point of articulation between what we have called the peduncle, and the last abdominal segment, is different in these two types.

In the first (*Ligia*, for instance), it takes place at the posterior margin of the ring, in a notch formed between what I have considered as the coxæ and the posterior margin of the ring, by the whole superior border of the peduncle, which is broad and flat, the exterior angle of which forms a regular ball-and-socket joint, which is received into a regular notch in the posterior angle of the ring, exactly similar to the notch on the under side of the "*epimeral*" of the cephalo-thoracic ring.

In the other (*Oniscus*, to wit), the inferior portion of the peduncle is narrowed, so that it appears to be articulated by the exterior angle only, the interior border being produced into a lobe, and attached to the extreme exterior edge of the last ring, or rather to a process of this ring, visible only below, and which may be looked on as the coxa reduced to a minimum and fixed to the ring; the form of articulation is the same as in *Ligia*.

This view of relations receives further confirmation on examination of the last abdominal ring in *Philoscia* and kindred forms, where the articulation is completed externally by a small triangular lobe, differing from the angle in *Ligia* only in size; indeed, it is a question whether I am strictly correct in describing *Philoscia* as wanting the "coxa" in the sixth abdominal ring, and not as having the coxæ fused to the ring.

The mode of articulation dependent on the development of coxæ in the last ring causes the peduncle to be more or less uncovered by the preceding coxæ, and has given rise to the erroneous description of Brandt, already referred to, viz., "*Ligiæ*—Caudal appendages, one pair" (Conspect., page 9); *Oniscinæ*—"Caudal appendages, two pairs" (ib., page 12); the absence, or rather complete fusion, of the coxa with the last ring causing the peduncle in *Oniscus*, &c., to be completely covered by the coxæ of the fifth rings, led Brandt to overlook its existence altogether, and to mistake the terminal appendages for separate organs.

2nd. The mode of articulation of the so-called external appendage (ischium), and the peduncle (basis).

This is always at the *extremity* of the peduncle, and generally on a plane inferior to that of the so-called internal appendage, the peduncle being hollowed out into a regular joint for its reception, and the external border of the peduncle terminating inferiorly in a tooth outside the articulation; the internal, on the other hand, arising from a lateral process, more or less distinctly marked, and generally on a plane much superior to the articulation of the external appendage. This is evident, even in such forms as *Ligia*, where the apex of the peduncle being truncated, the appendages arise from nearly the same point, the lateral process being slightly larger than the real apex, or as *Ligidium*, in which the lateral process is still further elongated, so that the ischium appears to arise above the internal appendage.

From this extreme we trace the lateral process till we arrive at such forms as *Oniscus*, where, without careful examination, we might doubt its existence at all, and where, to a superficial examination, the internal appendage appears to have no connexion with the peduncle at all, but rather to spring directly from the last ring: but more of this genus anon.

3. The difference in form and relations between the external (ischium) and internal (accessory filament) appendages.

Besides the difference between these two, displayed in the fact of the one (ischium) being articulated to the *extremity*, the other (accessory filament) to the *lateral* process of the peduncle, the differences of the two are remarkable.

The external (ischium) is generally more or less compressed, often abrupt at its termination, and generally ending in a tuft of hairs.

The internal (accessory filament), on the other hand, is rounded, spine-like, generally made up of more than one articulation, and terminates in a hollow hair, or rather becomes filamentous, presenting in short, all the characters of a true accessory appendage; it is from this character I have named it the accessory filament.

Having established these relations, next for a detailed description of the entire organs, i. e. first, the peduncle or basis; second, ischium; third, accessory filament.

1. *The Peduncle or Basis*.—This is attached to last abdominal ring, and is either somewhat quadrilateral, without distinct lateral process, its inner margin dilated into a lobe (*Ligia*).

Or else somewhat triangular; its internal margin produced into a rounded process, which bears the accessory filament (*Philoscia*, *Oniscus*).

The lateral process (obsolete in *Tylos*) is either distinct, produced beyond, and arising from inner angle of the apex of the peduncle (*Ligidium*), arising from near the base of the peduncle (*Oniscus*, *Porcellio*); or else indistinct, and almost on the same level as the apex (*Ligia*); between these, every gradation of development exists. The peduncle may, in fine, be described in general terms as a flattened articulation, generally furnished internally with an accessory appendage, bearing the ischium on its summit, and more or less covered by the last abdominal ring, from whence it arises.

2. *The Ischium or External Appendage*.—This articulates to the apex of the basis or peduncle, and is either—

Rounded, its base dilated and flattened, hairy and scabrous; its apex abrupt and tufted with hairs (*Ligia*, *Philoscia*, *Scyphax*, *Ligidium* (?), *Tylos* (?), *Sphærillo*).

Rounded, somewhat subulate, its base slightly dilated and compressed, smooth (*Philougria*, *Itea* (?), *Titanethes* (?), *Styloniscus* (?).

Flattened, acuminate, dilated, hairy, scabrous (*Oniscus*, *Porcellio*, *Scyphax* (?)).

Flattened, dilated, squared, apex truncate or rounded, broader below than above, hairy (*Armadillium*, *Actecia* (?), *Armadillo*).

Accessory filament or internal appendage, either—

Tapering, rounded, terminating in a jointed filamentous hair (*Ligia*, *Philoscia*, *Philougria*), or—

Flattened, apex truncate, wider than base, club-shaped, fringed with hairs (*Armadillium*); or—

Obsolete (*Tylos*).

The published details of foreign genera are so inaccurate that I must confine myself mainly to our native species in my description of types, merely glancing at one or two of the former, of which sufficient details have been published. Those which have no British representatives are marked with an asterisk.

1. **Peduncle* operculiform, triangular, broader above than below, articulated beneath last abdominal ring. *Lateral process* obsolete; *ischium* short, subulate (?), articulated to apex of peduncle. *Accessory appendage*, none (*Tylos*).

2. *Peduncle* irregularly quadrilateral, much broader than long, outer side produced, articulated by lower margin beneath exterior angle of posterior border of the last ring; entire peduncle almost covered by the ring. *Accessory lobe* triangular, springing from base of peduncle, scarcely half length of peduncle. *Ischium* irregularly quadrilateral, base much narrower than apex, which is transverse; inner side produced at apex, borders hairy. *Accessory appendage* nearly twice length of *ischium*; base rounded, narrow; apex flattened, club-shaped, hairy and scabrous (*Armadillium*, *Armadillo* (?). To this neighbourhood, probably, *Sphærillo* and *Diploexochus*). Plate XXI., Figs. 12, 13.

3. *Peduncle* triangular, much longer than broad, articulating border notched at outer angle, outer margin produced into lobe at base, apical angle well marked, apex half breadth of base, articulated to exterior angle of last ring beneath. *Accessory lobe* distinct, quadrilateral, about third length of peduncle, arising from articulating margin, completely covered by last abdominal ring. *Ischium* compressed, acuminate, trigonal, lobed on inner side, hairy. *Accessory appendage* curved, trigonal at apex, lobed at base, terminating in filament, two-thirds concealed beneath terminal ring, two-thirds length of *ischium* (*Porcellio*, *Oniscus* (which has *accessory lobe* nearly obsolete), *Platyarthrus*, probably). Plate XX., Fig. 11.

4. *Peduncle* quadrilateral, transverse, twice as broad as long, superior articulating border produced into an angle, articulated to lateral border

of last abdominal ring. *Accessory lobe* distinct, nearly attaining apex of peduncle, unconcealed by last ring. *Ischium*—base flattened, apex acuminate, bi-articulate, hairy, and spined along edges. *Accessory appendage* falciform, hairy, apex blunt, three-fourths of length of ischium (*Philoscia*).

5. *Peduncle* somewhat triangular, as long as broad, superior border terminating internally in an angle, articulated in a notch of the posterior linear border of the last ring, which passes back below coxa of fifth ring. Exterior margin produced into a triangular lobe. *Accessory lobe* triangular, distinct, nearly attaining apex of peduncle, unconcealed. *Ischium* subulate, somewhat trigonal at base, terminating in a long filament, smooth. *Accessory appendage* curved, needle-shaped, smooth, nearly equal in length to ischium (*Philougria*, *Itea* (?), and probably also *Trichoniscus*).

6. *Peduncle* quinquangular, oblong, superior border narrow, articulated in a distinct notch at the posterior margin of ring; apex truncate; exterior angle acute; lateral lobe obsolete. *Ischium* elongated, trigonal, rough, hairy. *Accessory appendage* rounded, subulate, slightly larger than ischium, terminating in a filament (*Ligia*).

Besides these there are several intermediate forms, as *Ligidium*, in which the accessory lobe far exceeds apex of the peduncle—*Actæcia* (*Dana*), in which the external angle of apex is produced into a lobe, so that the ischium appears to be lateral; but sufficient has been said on the subject.

The whole of these appendages are capable of reproduction, and it is common to find *Ligia* with them in a rudimentary state. They preserve their comparative characters, even in the young state of the animals, the only difference being, that the accessory lobe is somewhat more strongly marked, and afford the most valuable of all the characters which I have mentioned, for fixity of a type.

The order of value of these characters is:—

Generic. 1st. Appendages of, and last ring of abdomen.

2nd. Arrangement and form of external antennæ.

3rd. Proportional development of coxæ of abdominal rings.

4th. Development of antennal rings.

Familiar. 1st. Appendages of last ring of abdomen.

2nd. Proportional development of coxæ.

3rd. Arrangement and form of external antennæ.

The characters of the internal antennæ and of the parts of the masticatory apparatus are chiefly of familiar import: they are so difficult to establish that I have omitted them in this rough sketch, which is put forward merely as an attempt at a more natural arrangement of these genera than those published. It will be found that I have also omitted all mention of the internal anatomy for the present.

Many of the foreign genera are so scantily described, that it would be foolish to attempt anything like generalities here, and this whole paper, as I said before, is merely provisional, the rather as I hope before long to examine into, not merely genera, but species, as at present far too many false ones incumber our systems.

Provisional Arrangement of Families.

The genera described are British.

Family.—TYLIDÆ.

Genus 1.—TYLOS (*Latreille*).

Family.—ARMADILLIDÆ.

Genus 1.—ARMADILLO (*Brandt*).

Genus 2.—CUBARIS (*Brandt*).

Genus 3.—SPHÆRILLO (*Dana*).

Genus 4.—ARMADILLIUM (*Brandt*).

Body semi-globose; head rounded, median lobe minute, arcuated, as a triangular shield. External antennæ: second joint of peduncle lobed. Tige three-jointed, hairy, rounded. Coxæ of first and sixth abdominal rings obsolete. False feet of last pair: peduncle flattened, lamellar, truncate. Ischium flattened, truncate; external angle produced. Accessory lobes arising from base. Accessory filament flattened, club-shaped, concealed.

Genus 5.—DIPLOEXOCHUS (*Brandt*).

Genus 6.—(?) ACTÆCIA (*Dana*).

(Which probably should stand as a representative of a separate family.)

Family.—PORCELLIONIDÆ.

Genus 1.—ONISCUS (*Latreille*).

Body flattened. Head transverse, lateral lobes well developed from superior margin of third ring, which is emarginate in the median line, not attaining to front, *passing out beneath the orbits*. Internal antennæ inconspicuous. External antennæ: peduncle, second joint lobed at base. Tige three-jointed, articulations rounded, cupped. Coxæ of first, second, and sixth abdominal rings obsolete; third to fifth, broad, curved. Abdominal false feet articulated beneath external angle of last ring. Peduncle triangular, lamellar. Accessory lobe obsolete. Ischium compressed, trigonal, lamellose, along with three-fourths of peduncle unconcealed. Accessory appendage curved, trigono-subulate, almost concealed, arising from basal angle of peduncle, which is truncate.

Genus 2.—PORCELLIO (*Latreille*).

Body flattened or semi-globose (*armadilloides*). Head transverse: lateral and median lobes well marked, *arising from superior margin of third ring, which surpasses frontal line, and is not continuous beneath orbits*. Internal antennæ inconspicuous. External antennæ: second

joint broadly lobed internally. Tige two-jointed; articulations semi-flattened, hairy. Coxæ of first, second, and sixth abdominal rings obsolete. Abdominal false feet of last pair articulated *beneath* basal angles of last ring. Peduncle triangular, lamellar, three-fourths uncovered. Accessory lobe well-marked, arising from base of peduncle, covered by last ring. Ischium compressed, trigonal, lamellose, acuminate, uncovered. Accessory filaments curved, trigonal, terminating in a filament nearly completely covered by last abdominal ring.

Genus 3.—(?) *PLATYARTHUS* (*Brandt*).

Genus 4.—(?) *DETO* (*Guerin*).

Family.—*LIGIDÆ*.

Genus 1.—*LIGIA* (*Brandt*).

Body flattened. Head transverse. Internal antennæ inconspicuous. External antennæ: second joint, peduncle without lobe. Tige multi-articulate; segments globose, cupped, hairy. Coxæ of abdominal rings: first and second small; third to sixth, well developed. Abdominal false feet articulated in notch at end of last ring, unconcealed. Peduncle quadrilateral. Accessory lobe inconspicuous from truncate apex. Ischium somewhat trigonal, scabrous. Accessory appendage as long as ischium, terminating in a filamentous hair.

Family.—*PHILOSCIDÆ*.

Genus 1.—*LIGIDIUM* (*Brandt*).

Genus 2 (?)—*STYLONISCUS* (*Dana*).

Genus 3 (?)—*TITANETHES* (*Schödtte*).

Genus 4.—*PHILOSCIA* (*Latreille*).

Body flattened. Head rounded. Antennal ring arcuate, attaining to, but not surpassing, frontal line. Internal antennæ inconspicuous. External antennæ, second articulation, rounded without lobe. Tige, three-jointed articulations rounded, hairy, terminating in a filament. Coxæ of sixth abdominal ring obsolete, first to fifth narrow, linear. Abdominal false feet, last pair: peduncle quadrilateral, transverse, articulated to exterior margin of last ring, uncovered. Accessory lobe distinct, attaining apex of peduncle. Ischium: base flattened, acuminate, almost trigonal, bi-articulate, hairy; accessory filament falciform, hairy, apex blunt.

This genus has been misdescribed by all authors except Zadach, who gives a very fair description of it in his monograph, already quoted.

5.—(?) *SCYPHAX* (*Dana*).

(*Scyphax* and *Philoscia* may form the type of a separate family.)

Family.—ITEADÆ.

Genus 1.—(?) *TRICHONISCUS* (*Brandt*).Genus 2.—(?) *ITEA* (*Koch*, in part).Genus 3.—(?) *PHILOUGRIA* (*mihi*).

Body flattened. Head round; no median or lateral lobes. Internal antennæ inconspicuous, three-jointed. External antennæ: second joint round, not lobed. Tige subulate, five-jointed; smooth. Coxæ of first abdominal ring small and inconspicuous; second to fifth, narrow, linear, well marked; sixth, nearly obsolete. Abdominal false feet: last pair completely uncovered. Peduncle somewhat triangular, articulated in notch at posterior margin of last joint. Ischium trigonal, subulate, smooth, terminating in a filament. Accessory lobe well marked, springing from side of, and nearly attaining, extremity of apex of peduncle. Accessory filament long, subulate, filamentous, smooth.

This genus is very closely allied to *Itea*, which is described by Zadach as having the *exterior margin* of the peduncle of the abdominal false feet *free*; lateral processes of the front present, beneath the superior frontal margin, above the base of the antennæ; the internal antennæ one-jointed. Characters, if correctly given, sufficient to constitute the above a genus.

Some, perhaps, will be inclined to substitute the term genus for family in the above Table, making sub-genera of most of the genera. Against this custom, too prevalent now-a-days, I must enter my protest: every distinct set of forms possessing one or two important parallel characters in common, should rather constitute a genus, than by, as is too often done, grouping a number of these in one genus, necessitate the formation of sub-groups, which are always most puzzling to the student, and of no use unless to the systematist addicted to *mere number* of families in some preconceived order of numeral arrangement.

List of British Species of Oniscoidea.

Family.—ARMADILLIDÆ.

Genus.—*ARMADILLIUM* (*Brandt*).

(Armadillidium of Brandt shortened in conformity to modern usage.)

Armadillium vulgare (*Latr. sp.*)

Synonyms: *Oniscus armadillo* (*Linn.*), *O. cinereus* (*Zenk.*), *Armadillo vulgaris* (*Latr.*), *A. variegatus* (*ib.*), *Armadillidium Zenckeri* (*Br.*), *Armadillo opacus, variegatus, Willii* (*Schæffer*).

Body smooth, elliptical; median plate arched above, scarcely surpassing frontal line. Terminal ring of abdomen narrow (coxæ obsolete), triangular: apex truncate. False feet of last pair: basis nearly completely concealed, bilobed; internal lobe much shorter than external; a raised transverse ridge on inferior face. Ischium flattened, somewhat triangular, wider below than above. Secondary appendage trigonal, broader below than above, compressed, hairy at the end. Second joint of external antennæ lobed.

Colour: dark steel-gray, almost black; steel-gray blotched with patches and spots of whitish-yellow and red browns.

Habit: rolls itself into a ball.

Habitat: dry places under stones, decaying timber, and amidst herbage.

Distribution: Ireland generally. England—London, Kent.

Family.—ONISCIDÆ.

Genus.—ONISCUS (Linn.).

1.—*Oniscus murarius* (Cuvier).

Synonyms: *O. asellus* (Linnæus, and Auct.).

Body oval, shining, covered with smooth granules; lateral lobes of head large, inclined backwards; frontal line somewhat emarginate; terminal ring of abdomen elongate, triangular, convex above; coxæ terminating as acute angle; coxæ of fifth concealing origin of accessory appendage. Accessory appendage nearly equalling ischium in length. Second joint of external antennæ lobed internally.

Colour: general ground light-gray or bluish, with blotches and patches of yellow, generally lineally arranged; a salmon-coloured variety with dark patches occasionally met near sea.

Habits: semi-rolls, and feigns death.

Habitat: under decayed vegetable and animal matter, as well in the driest as wettest localities. Common near sea.

Localities: Ireland—east coast generally. England—Kent, London, &c. Appears to be common everywhere, but the species have not been distinguished.

2.—*Oniscus fossor* (H. Schæffer, D. Crus., Cah. 22, n. 22).

Synonyms: *Oniscus muscorum* (Lereboullet, p. 29). I cannot speak of the other synonyms given by the author, as he has confounded it with *Philoscia muscorum*. *P. tæniola* (Koch), given by him as a synonym, is figured as a true Porcellio by Schæffer. The figure of *O. fossor* is very characteristic.

Body oval, covered with numerous rough granulations, which give it a powdered appearance; head convex; lateral lobes moderate, rounded; frontal line produced into a triangular lobe which belongs to head, not to antennal ring; terminal ring and other characters as *O. murarius*, than which the whole animal is much smaller.

Colour similar to *O. murarius*, but paler.

Habits: semi-rolls, and feigns death; much more active than *O. murarius*.

Habitat: dryish places, as under stones, dry leaves.

Localities: Ireland—Dublin (Wexford, E. Percival Wright, Esq.).
England—Epping Forest, Kent. Very common among the chalk-pits at Chisselhurst; now first recorded as British. (Three specimens in British Museum Collection undistinguished from *O. murarius*.)

Genus.—PORCELLIO (Latreille).

1.—*P. scaber* (Latreille).

Synonyms: *Oniscus asellus* (Linn), *O. granulatus* (Lam.). *Porcellio dubius*, *affinis et mult. al.* (H. Schæff.), *P. Brandtii* (M.-Edwards).

Body elongate, oval, rugous. Lateral processes very salient; external angle rounded; median process triangular; terminal ring ending in a triangular point, acuminate, deeply sulcate in the median line.

Colour: uniform grayish-black, yellow blotches on dark ground; a nearly uniform salmon-coloured variety also met with; there may be two species confounded.

Habit: runs with agility; semi-rolls itself; attacks living caterpillars.

Habitat: moist places, everywhere there is decaying matter; among sea-weed on sea-shore along with *Ligia*, &c. The paler varieties are found in the dryer localities.

Distribution: apparently everywhere, and very common; carries the young all through the summer.

2.—*P. dilatatus* (Brandt).

Synonyms: *P. scaber* (Auct. and M.-Edw.).

Body very broad, depressed, rough, and granular; lateral frontal processes very prominent, rounded at apex, and hollowed; median lobe obtusely triangular, moderate; last ring rounded at apex, plane above. Ischium very flat and broad. Much larger than *P. scaber*.

Colour: a uniform slate-gray.

Habit: crawls very slowly, semi-rolls; extremely brittle in its structure, a touch causing the limbs to fall off.

Habitat: amongst decaying grass and straw, extremely rare.

Localities: Ireland—Dublin. Now first added to British lists.

3.—*P. pictus* (Auct.).

Synonyms: *P. conspersus* (?), *P. serialis*, *P. crassicornis* (H. Schæffer).

Body as *P. scaber*, slightly elongated; lateral lobes very salient, curved outwards; median lobe curvilinear, small; body granulous, last ring triangular, acute at apex, superior surface sulcated.

Colour similar to *P. scaber*, but patches more regularly arranged; may be easily mistaken for *Oniscus fossor* at first glance, but is more shining.

Habit: runs with great agility, does not roll.

Habitat: very local; dry places, as old ruins, under dry leaves.

Localities: Ireland—Dublin (local), Belfast (A. H. Halliday, Esq.)
England—Chisselhurst, Kent, among chalk-pits; now first added to British lists.

4.—*P. lœvis* (Lam.).

Body very convex, polished; lateral frontal lobes slightly salient, small, rounded; median lobe triangular, very short; last ring, apex rounded, deeply sulcate above. The largest of our species.

Colour: lead-gray, occasionally blotched with yellow on sides.

Habits: semi-rolls, sluggish.

Habitat: common everywhere in moist places, especially in stables and litter, among grass at bottom of walls.

Localities: Ireland—Dublin. England—Kent (one specimen in British Museum Collection, from neighbourhood of London).

5.—*P. pruinosis* (Brandt, Conspect. 19.)

Synonyms: *Porcellio frontalis* (Lereboullet), preoccupied by Edwards. *P. maculicornis* (?) (H. Schaffer).

Body sub-ovate, oblong, slightly rugged, downy. Lateral lobes small, rounded. Median lobe rounded, minute, almost linear; last ring triangular, acute at apex; surface plane. Feet very long. Abdomen much narrower than cephalo-thoracic rings.

Colour: uniform mouse-colour, marbled under the lens with white.

Habit: runs with great agility, concealing itself rapidly from the light; preferring moderately humid, warm situations; one of the commonest of our species. It buries itself to a considerable depth in clay.

Locality: Ireland—Dublin; everywhere. England—Kent, Chisselhurst, very common. (Three specimens (unnamed) in British Museum Collection, from neighbourhood of London, belong, I believe, to this species. They are stuck on cards, rendering examination impossible.) Now first added to British lists.

6.—*P. armadilloides* (Lereboullet).

Synonyms: *O. convexus* (Degeer), *O. saxatilis* (Hartmann).

Body elongated, elliptical; segments very convex, smooth. Lateral lobes minute, truncated in front. Median lobe very short, angular, acute. Last ring of abdomen acute, plane, or slightly convex above.

Colour: iron-gray, with clear borders to segments; a band of white blotches along either side of the median line. Never having seen it alive, cannot speak of its habits. Rolls itself into a perfect ball.

Added to British lists on authority of six specimens in British Museum Collection (unnamed), which A. White, Esq., informs me were captured near London (Highgate) (?) by Mr. Walker.

7.—*P. cingendus* (n. s.) (*miki*). Plate XIX., Fig. 1.

Body elongate, ovate, *smooth, or slightly scabrous*. Lateral lobes minute, rounded, directed downwards. Median lobe nearly obsolete, arcuate. Terminal ring broadly triangular; apex acute, plane above; a raised continuous line along upper margin of each ring. Whole animal shining, smooth, or covered with minute shining granulations only. Closely allied to *P. pruinus*, from which it differs chiefly in the smooth, shining body, and the coxæ of cephalo-thoracic rings having their posterior angles rounded off.

Colour: bright red and yellow blotches on a dark steel-gray ground.

Habits: runs with extreme rapidity; inhabits dry stations exclusively, as under leaves; never rolls itself into a ball.

Localities: Dublin, very rare.

The characters given above are constant, easily distinguishing it from *P. pruinus*, which, when young, resemble the parents. I can find no description in authors approaching this species, and am, therefore, compelled to give it a name. I find it both in company with *P. pruinus*, and also alone.

Family.—LIGIDÆ.

Genus.—LIGIA.

1.—*Ligia oceanica* (Lin. sp.)

Synonyms: *Oniscus oceanicus* (Linn.), *P. aquaticus* (Baxter), *Cymothoa oceanica* (Fabric.), *Ligia oceanica* (ib.).

Body flattened, oval. Head transverse, covered with smooth granulations. External antennæ shorter than body. Tige multi-articulate, sub-glabrous. Terminal ring of abdomen: posterior border regularly arcuated in the middle. Coxæ as acute angles. Abdominal false feet: peduncle oblong, slightly shorter than last abdominal ring. Ischium and accessory appendage twice the length of peduncle.

Colour: yellowish-brown, the young prettily diced with white.

Habits: runs with agility, or rolls up extremities of body, and feigns death; very common among vegetable debris, along tide-marks, and on rocks; seldom takes water; may be seen running over sand in full sunshine.

Common around Ireland.

Family.—PHILOSCIADÆ.

Genus.—PHILOSCIA (*Latreille*).1.—*Philoscia muscorum* (Latreille). Plate XX., Fig. 1.

Synonyms: *Ligia melanocephala* (H. Schæffer), *Oniscus sylvestris* (?) (Fabric.), *Oniscus muscorum* (?) (Cuv.). I have not been able to verify the reference queried. *Philoscia muscorum* (Zaddack, Syn. Crust. Prussic., p. 14).

Body flattened, elliptical, perfectly smooth and glistening. Head transversely elliptical, arched in front; neither lateral nor median lobes. Internal antennæ three-jointed. External antennæ: second joint of peduncle not swollen at base. Tige three-jointed; articulations rounded, tumid, the last terminating in a hair, a long spine at apex of fourth and fifth articulations, all the articulations both of peduncle and tige densely hairy. Coxæ of abdominal rings somewhat linear; abdomen abruptly narrower than seventh cephalothoracic ring. Last ring broadly triangular; apex acute. Abdominal false feet, last pair, attached to exterior margin of ultimate ring, uncovered. Peduncle somewhat quadrilateral. Ischium trigonal, spinous along edges, fine hairs between spines, with a slender filament at its apex. Accessory appendage not quite half length of ischium rounded, hairy. Accessory lobe triangular, distinct, nearly attaining apex of peduncle.

Colour fulvous, with dark black patches, a dark stripe generally along median line. A pale salmon-coloured variety was brought me by E. Percival Wright, Esq., from Wexford, which I have found since rather common on Bray Head, county of Wicklow, and occasionally about Donnybrook, county of Dublin.

Habitat: dry places among leaves, also among sand hills, along sea-shore, under stones; common near sea.

Habits: runs rapidly, feigns death, but does not roll into a ball.

Localities: Ireland—Dublin, extremely common; Wicklow, Meath, (Wexford and Cork, E. Percival Wright, Esq.), Belfast (A. H. Haliday, Esq.) England—Middlesex, Essex, Kent, common.

A species which has been much misunderstood, although an extremely common species.

Family.—ITEADÆ.

Genus.—*PHILOUGRIA* (φίλος ὕγρος) (*mihi*).

1.—*Philougria celer* (*mihi*). Plate XXII., Fig. 1.

Body semi-flattened, elliptical, perfectly smooth and shining. Head oval, twice as broad as long; neither lateral nor median lobes extant; antennal plate attaining to frontal line. Eyes small, oval, situated at posterior angle of head. Internal antennæ small, inconspicuous, three (two?) jointed. External antennæ moderate in length, generally curved, folded in form of (Σ). Peduncle five-jointed, attached to detached segment (epimeral?) of ring, hence apparently six-jointed. First articulation very short, transverse; second, obtusely triangular, longer than first; third, globular equal to second; fourth, elongated, slender, sides parallel, equal to second and third conjoined, its exterior superior angle truncate, inner angle ending in a long hollow spine; fifth, slenderest, and slightly longer than fourth, sides nearly parallel, internal margin produced into four angular eminences, each of which bears a short spine, external angle terminating in a filament, external border hairy. Tige five-jointed, filamentous; articulations cylindrical, gradually

D

tapering; first, short; second, third, and fourth, equal; fifth equaling second, third and fourth conjoined; terminating in a filament; perfectly free from hairs or spines. Coxæ of cephalothoracic segments well marked. Segments of cephalothorax: first, much broader than head, second and third gradually broader; third and fourth equal; fifth, sixth, and seventh gradually decreasing in breadth; seventh as broad as first. Posterior margin of first three rings convex downwards; fourth and fifth, median portion convex downwards, coxæ concave upwards; sixth and seventh rings concave downwards, their coxæ quadrilateral, strongly angular, suture well marked; coxæ of the seventh extending half-way down fourth abdominal ring; raised transverse border along margin of each ring; a border of small spines along lateral edges of coxæ (visible under $\frac{1}{4}$ inch power). Abdominal segments: first, semilunar, very linear, coxæ nearly obsolete, covered by those of seventh cephalothoracic segment: second, linear, coxæ rounded, uncovered by seventh cephalothoracic ring; third, fourth, and fifth, each equal in breadth to first and second conjoined; coxæ well marked and curved, inferior border of entire segment convex medianly and deeply concave externally, so as to form a projecting angle, gradually decreasing in breadth from third downwards; terminal ring deeply concave over insertion of last false feet, the segment being here linear, coxæ nearly obsolete, medianly produced, truncately triangular, apex deeply emarginate; total length of ring about twice that of fifth; the rings gradually increase in length from one to six. Abdominal false feet: last pair uncovered, articulated in excavated posterior margin of last ring. Peduncle, and ischium, and accessory filament, as in genus, *q. v.*

Colour: uniform red brown, without spots or marbling, though varieties may occur.

Habits: runs with agility, as conveyed in the name; buries itself deep in the ground, and generally congregates in numbers; very impatient of dryness, soon dying on exposure to air.

Habitat: very moist places, amongst all kinds of decaying matter; also amongst moist dead leaves, amongst wet ashes, in moss, at roots of trees: extremely common. I cannot account for this species remaining so long undetected in Britain.

Localities: Ireland—Dublin, very common (Wexford, Cork, and Kerry, E. Percival Wright, Esq.).

England—Epping Forest, near London, Kent, Chisselhurst, where it seems as common as in Ireland.

Now first added to British list.

DESCRIPTION OF PLATES.

PLATE XIX.

Fig. 1, *Porcellio cingendus*. Fig. 2, Head and first cephalo-thoracic ring of do. Fig. 3, Head and first cephalo-thoracic ring of *P. pruinosus*. Fig. 4, Fifth and sixth abdominal rings of *P. cingendus*. Fig. 5, Fifth and sixth abdominal rings of *P. pruinosus*. Fig. 6, Back view of head of *P. cingendus*. Fig. 7, Back view of head of *P. pruinosus*. Fig. 8, Abdominal false feet of *P. cingendus*. *a*, Peduncle. *b*, Accessory lobe. *c*, Ischium. *f*, Accessory filament. Fig. 9, Tige of external antenna of *P. cingendus*. Fig. 10, Front view of head, and side view of orbit of *Oniscus murarius*. *a*, Line of front. *b*, Lateral lobes. *c*, External antennæ. *d*, Transverse suture. Fig. 11, Peduncle of external antennæ of *O. murarius*. Fig. 12, Abdominal false feet of *O. murarius*. (References as in Fig. 8.)

PLATE XX.

Fig. 1, *Philoscia muscorum*, much enlarged. The antennæ disproportionately large. Fig. 2, Abdominal false feet, last pair (♂). *a*, Peduncle. *b*, Accessory lobe. *c*, Ischium. *f*, Accessory appendage. Fig. 3, Fifth and sixth abdominal rings. *a*, Abdominal false feet. Fig. 4, Back view of head. Fig. 5, Front view of head. *a*, External antennæ. *b*, Internal antennæ. *c*, Superior margin, third segment. Fig. 6, Internal antennæ. Fig. 7, *Ligia oceanica*, false feet. References as in *Philoscia muscorum*. Fig. 8, Ultimate abdominal ring. *a*, False feet. Fig. 9, Side view of orbit. Fig. 10, Front view of head. *a*, External antennæ. *c*, Superior margin of third ring. *d*, Internal antennæ. Fig. 11, Back view of head of *Oniscus murarius*. *e*, Frontal line of head. *c*, lateral lobes. 3 *c*, back of head.

PLATE XXI.

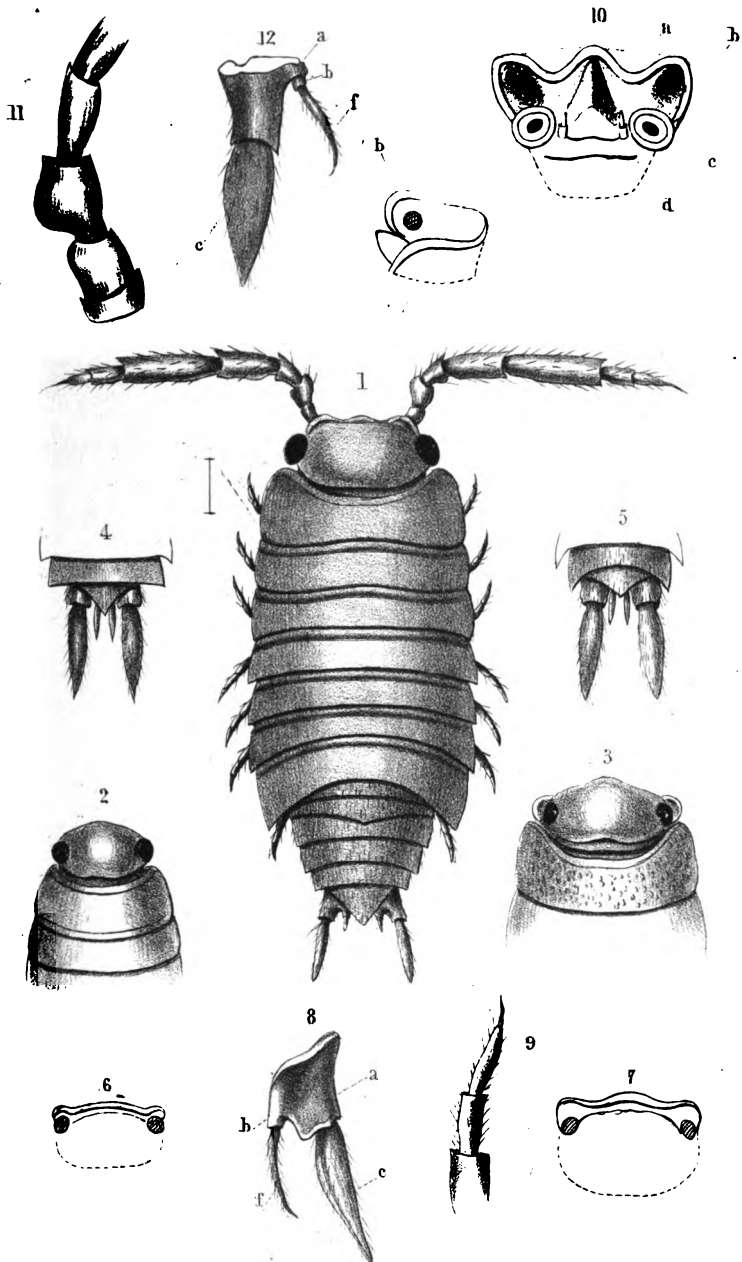
Fig. 1, External antennæ of *Porcellio pruinosus* (immature). *a*, Tige. Fig. 2, External antennæ of *P. scaber* (immature). Fig. 3, Antennæ of *Armadillium vulgare*. (A) Internal. (B) External. *b*, Tige. Fig. 4, Peduncle and tige of external antennæ of *Philoscia muscorum*. Fig. 5, External antennæ of *Oniscus fossor*. Fig. 3A, Tige of

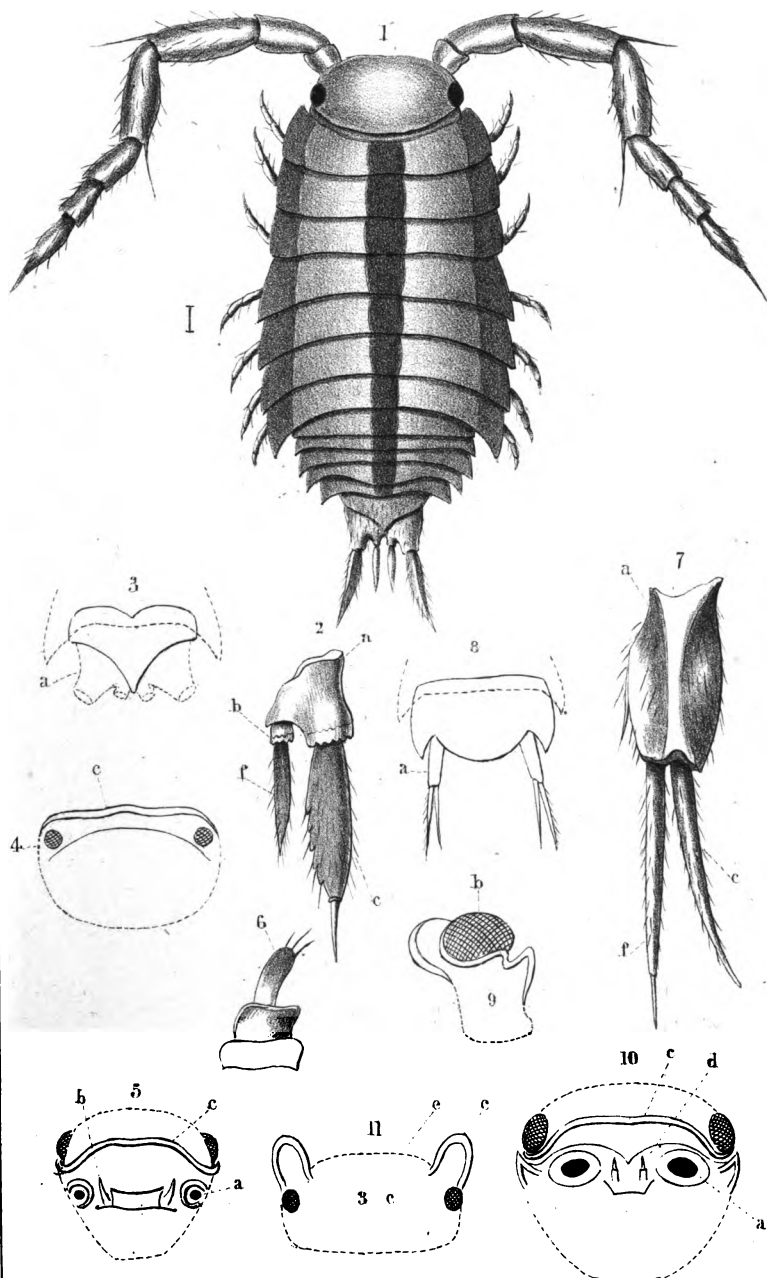
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O. murarius (immature). Fig. 6, Abdominal false feet of *O. fossor*. Fig. 7, Terminal rings of *O. fossor*. Fig. 8, Terminal rings of *Porcellio scaber*. The numeral is omitted. Fig. 9, False feet of *Armadillium vulgare*. Figs. 11 and 12, Last abdominal rings. Back and front view of head of *Armadillium vulgare*. Fig. 14, External and internal antennæ of *Ligidium Persooni* (after Lereboullet).

PLATE XXII.

Fig. 1, *Philougria celer* (*n. s.*), much magnified. Fig. 2, Last pair abdominal false feet, front and back view of ditto. *a*, Peduncle. *b*, Accessory lobe. *c*, Ischium. *f*, Accessory appendage. Fig. 3, Terminal abdominal rings. Fig. 4, Tige of external antennæ. Fig. 5, Abdominal false feet of *Tylos*, after Dana. Fig. 6, Abdominal false feet of *Actæcia*, after Dana. Fig. 7, Abdominal false feet of *Scyphax*, after Dana. Fig. 8, Abdominal false feet of *Sphæcillo*, after Dana. Fig. 9, Abdominal false feet of *Ligidium Persooni* (after Lereboullet).

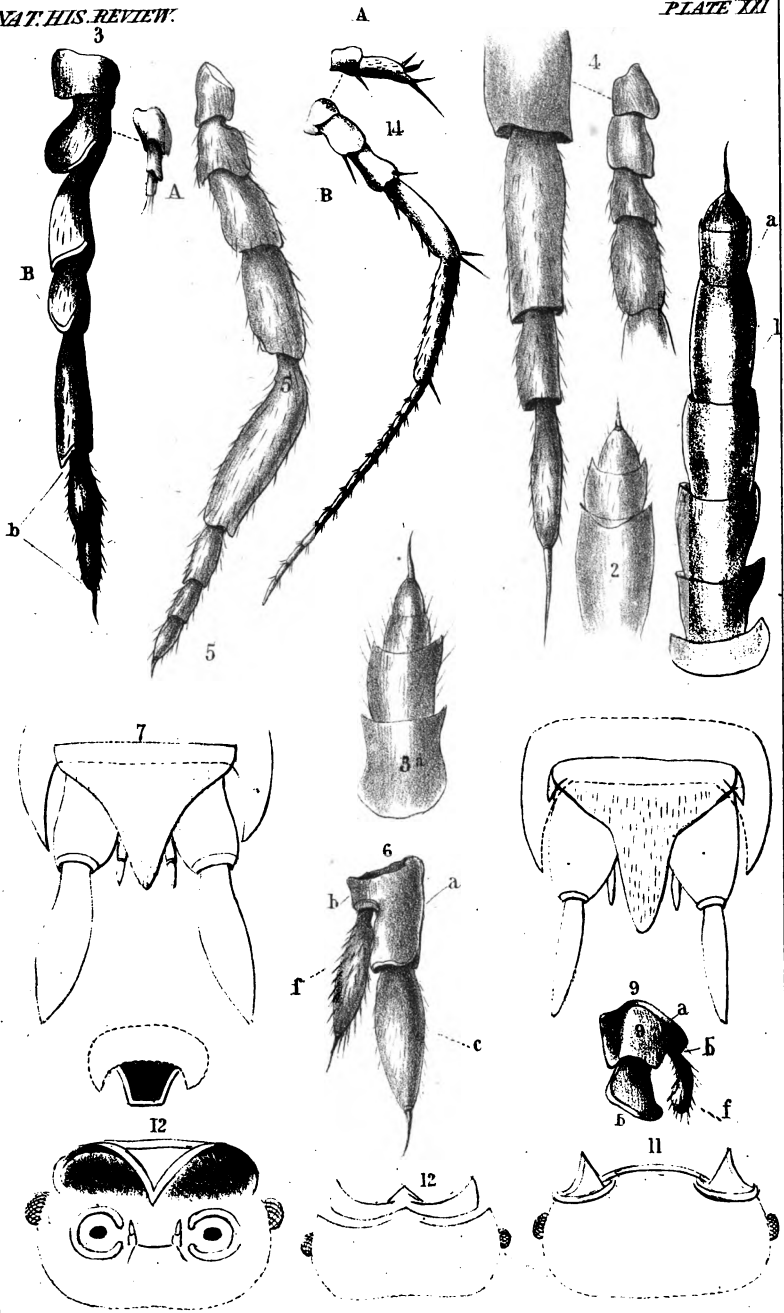




L. cut. nat.

Forster & Co. Dublin

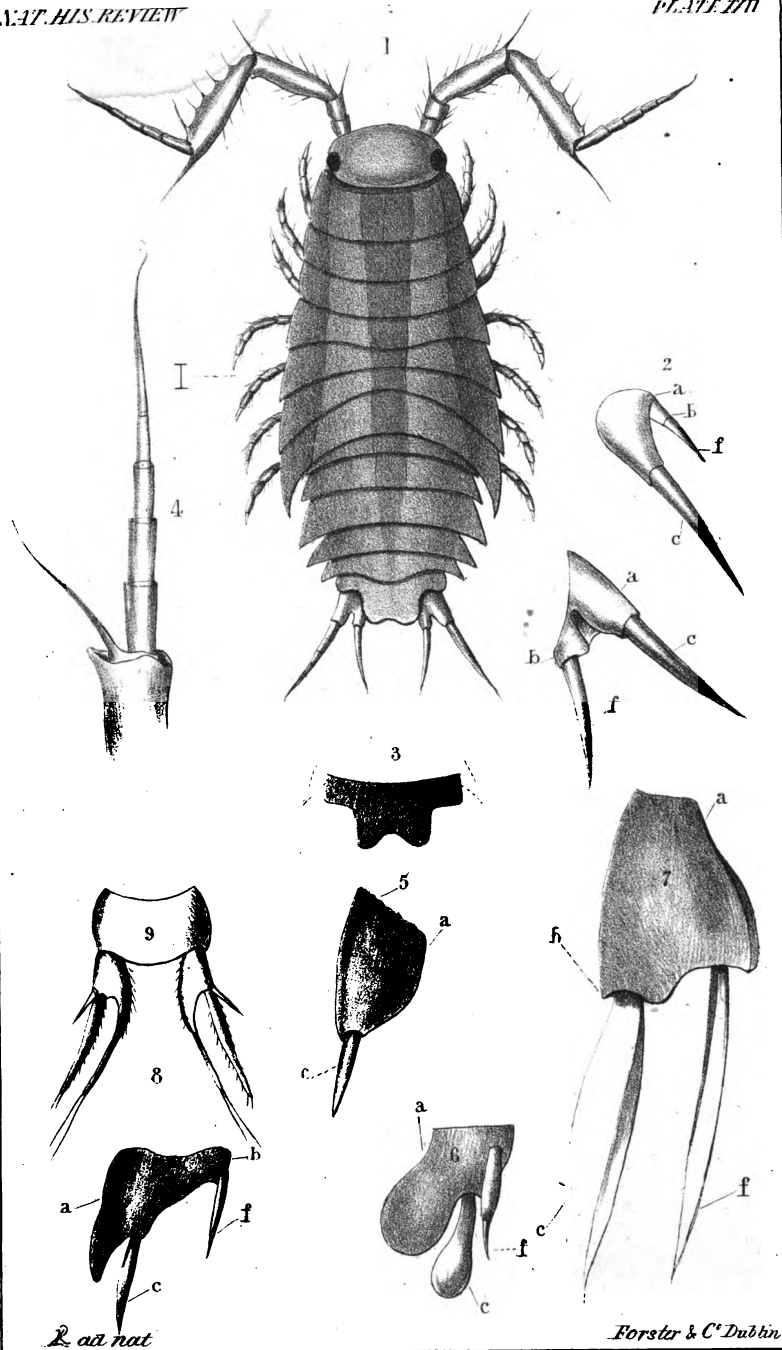
October 1837



R. all. nat.

Forster & Co. Dublin.

October 1857



October 1857

French

Nov 23, 1917

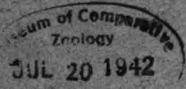


PROCEEDINGS

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1858.



S-E-S-D

PROCEEDINGS
OF THE
NATURAL HISTORY SOCIETY OF DUBLIN.

VOL. I.

1856-58.

"O Lord, how manifold are thy works! in wisdom hast thou made them all: the earth is full of thy riches."—PSALM civ. 24.

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[From the "Dublin Natural History Review and Quarterly Journal of Science."]

ON THE GENUS EUOMPHALUS, AND ITS RELATIONS TO PLEUROTOMARIA AND THE HALIOTIDÆ. WITH TWO PLATES. BY REV. PROFESSOR HAUGHTON.

(Vide page 26.)

THE Palæozoic genus *Euomphalus* is one that has given much trouble to palæontologists, in consequence of their hesitation to give the same names to genera of the secondary and Palæozoic periods, and also in consequence of serious variations in the different fossils that have been called by this name. Thus, it would be very difficult to state in what essential particulars the *Euomphalus* of Sowerby differs from the *Straparolus* of Montfort, and both from the common *Solarium* of Lamarck. M. D'Orbigny characterizes *Solarium* by its quadrangular or rounded mouth, the umbilic mostly crenulated on the rim; and *Straparolus* by its round or square spines, not crenulated on the rim of the umbilic. M. Pictet justly observes that this crenulation of the rim of the umbilic is not a constant character in *Solarium*, being, in fact, almost peculiar to the Tertiary species; while in the Cretaceous epoch there are only two or three species with the rim of the umbilic crenulated. I may add to this, that the well-known *Euomphalus pugilis* has the crenulation of the umbilical margin as fully developed as any fossil or recent *Solarium*.

Mr. Phillips founds the genus *Euomphalus* on the character that in the old shells the upper portion of the shell is partitioned off by the animal, which was provided with the means of depositing a septum of shell occasionally, after the manner of the chambered Cephalopoda. There was no communication, however, kept up between the chambers and the body of the animal, as in the Cephalopoda. This character, however, is far from being well established as a general characteristic of the *Euomphalus*, having been only established in some of the species, as *E. pentangulatus*, *E. acutus*, and *E. pugilis*. M. de Koninck maintains that all the species of *Euomphalus* have the external lip slit, like *Pleurotomaria*,—a circumstance which, if true, would undoubtedly require us to remove them from the family of the Trochidæ into that of the Haliotidæ. The character noticed by M. De Koninck is found in some of our Irish Carboniferous species, and is beautifully exhibited in a specimen, *E. regine* (Haughton) found by me at Sheffield, Queen's County. This specimen would be referred at once to *E. acutus*, were it not for the accidental preservation of a portion of the shell and of its original colouring and markings, which show that it had a deep slit in the exterior lip, and a sinus band, not distinguishable from that of many species of *Pleurotomaria*.

While the *Euomphalus* thus approaches *Pleurotomaria* in some of its forms, it connects itself with *Haliotis* in the remarkable species generally assigned at present to *Cirrus* (not Sowerby). There are three species of this kind known in the Palæozoic period:—*C. cristatus* of Ireland, *C. Goldfussi* of the Eifel, and *C. armatus* of Belgium. These fossils have the form of *Euomphalus*, and are provided with a series of aper-

tures on the upper surface of the spines, prolonged into tubes, similar in some instances to those of the *Haliotidæ*, and of these tubes the anterior remain open, while the posterior tubes are gradually closed up. We thus see that while *Euomphalus*, in its ordinary forms, belongs to the group of low-spined *Trochidæ*, yet that it keeps up the most intimate relations with *Pleurotomaria* and *Haliotis*; so far as mere form is concerned, *Euomphalus* cannot be separated from *Cirrus*; and yet the structure and habits of the animals inhabiting the two kinds of shells must have been very different, as the breathing apparatus indicated by the short tubes of *Cirrus* was of a totally different character, from that of *Euomphalus*.

If we were to judge by mere form, there would be the greatest difficulty in separating *Cyprina* from *Venus*; and yet even a palæontologist could tell that they differed, by the impression of the mantle on the shell.

But, although I admit that slight differences, where they indicate physiological structure, are and ought to be of importance, I may be allowed to doubt if they are as important to the geologist as to the zoologist. It must not be forgotten that, although Geology throws much light on some branches of Natural History, in filling up lacunæ in our knowledge, yet that our knowledge of the habits and structure of any fossil, however perfect, is at best extremely small, compared with our acquaintance with living forms. It is not, therefore, necessary to be so precise in our subdivisions of fossil as of recent genera, and no greater injury can be done to the science of Geology than has been, by the useless multiplication of worthless names, founded on distinctions which are necessarily trifling, because our knowledge of the true structure of the fossil is exceedingly imperfect.

In the present case (*Euomphalus* or *Solarium*), speaking simply as a geologist, it appears to me that all useful purposes will be served by retaining the same generic name for all the varieties, and dividing the genus into three subdivisions, as follows:—

EUOMPHALUS.

Type A.—Flat-spired; provided with breathing tubes like the *Haliotidæ*. Type species:—

1. *Euomphalus cristatus*.
2. *Euomphalus Goldfussi*.

Type B.—Raised spire; provided with a deep slit in the exterior lip, and a *sinus* band on the shell. Type species:—

1. *Euomphalus Reginæ* (Houghton).

Type C.—Ordinary flat spired, smooth forms of *Euomphalus*. Type species:—

1. *Euomphalus pentangulatus*.
2. *Euomphalus pugilis*.

DESCRIPTION OF PLATES III. AND IV.

PLATE III.

- Fig. 1. Under side of unique specimen of *Euomphalus cristatus* (Phillips), preserved in the Museum of Trinity College; locality not certain, but believed to be Strokestown, county of Roscommon. The figure shows the tubular character of the crests, which are closed below; their upper surface is not known.
- Fig. 2. Natural cast of same, taken from the upper surface of the limestone slab. The original, exclusive of the spines, is eight inches (nearly) in diameter.

PLATE IV.

- Fig. 1. A specimen of *Euomphalus acutus* (Sowerby); somewhat distorted by cleavage, probably from Little Island, county of Cork: this specimen belongs to the Museum of the Royal Dublin Society. It is remarkable for the semicircular sinuosity observable on the lines of growth in passing the keel of each whorl, which must have corresponded with a notch in the outer lip. There is, however, no *sinus*, as observable on Fig. 2.
- Fig. 2. *Euomphalus Reginae* (mihi), found in the lower limestone at Sheffield, Queen's County. Specimen unique, in Museum of Trinity College.

E. Reginae.—Testâ conicâ; spiræ angulo 70°; anfractibus 6-8, transversim eleganter striatis, sinu lato carinatis, suprâ tabulatis; aperturâ subquadrâtâ scissurâ, altâ superne denotâtâ.

Breadth to Height = 150 : 100.

This shell resembles in its general character *E. acutus*, but differs from it in two particulars; *first*, in having a better marked keel, which is formed by the flat upper surface of the whorl making a well-marked angle of 105° with the side; *secondly*, by the Pleurotomaria-like sinus band, which bevils off the angle of the keel; this sinus is $1\frac{1}{2}$ lines broad. The striæ on the surface of the shell form a reversed angle, well marked, as is shown in the figure.

- Figs. 3 & 4. Under and upper surface of two specimens of *Euomphalus pugilis* (Sowerby), showing the ornamental knobs, 20 to the whorl, characteristic of this species, which seems to be identical with *Euomphalus turberculatus* (De Koninck). This fossil is rare, although locally abundant in some parts of the lower limestone of the county of Kildare.

SESSION 1857-1858.

FRIDAY EVENING, NOVEMBER 13, 1857.

PROFESSOR W. H. HARVEY, M.D., M.R.I.A., F.L.S., PRESIDENT,
in the Chair.

The previous Minutes having been confirmed, the Secretary read the following—

REPORT OF COUNCIL.

IN submitting the nineteenth Annual Report, your Council has again to congratulate the Society on its past progress, and on the position which it now holds. During the Session seven new Members were added to the Society, and one former Member rejoined, making a total increase of Ordinary Members of eight. On the other hand, the loss of Members has been four—Halliday Bruce, Esq., by death; and three, Professor Allman, Dr. Farran, and R. J. Usher, Esq., by resignation. One Associate and six Corresponding Members have also been elected through the year, giving a total gain of eleven Members to the Society.

The additions to the Museum have been both numerous and valuable, as will be seen by reference to the list of them in the Journal, and in the Report of the Museum Committee, about to be presented to you this evening. Your Council cannot but regret, however, that this most important department is not as yet in as perfect a condition as could be desired, owing to the heavy yearly charges under which the Society labours; but it is to be hoped, ere the close of the next year, that some at least of the departments at present incomplete and unarranged will be fully displayed for the inspection of the Members. One important group—the Crustacea—heretofore only partially represented, has been during the year arranged, and, owing to the donations of Members, now contains more than three-fourths of the Irish Decapods, including nearly all of the rarer species, and several unique specimens. These are now so displayed as to be easy of access for reference and identification.

Two years since, your Council entered into arrangements by which the papers read before the meetings should be published in a collected form, in order to preserve in full the new facts elicited during each Session, and thus place the Society in a position to exchange its Transactions with home and foreign Societies. The good effect of this arrangement was so apparent, that when, at the commencement of the past Session, through the unavoidable expenses attendant on the occupation of these rooms, a difficulty arose in carrying out the pecuniary portion of the agreement, your Council felt justified in appealing to the Mem-

bers to form a publication fund, to which appeal many of the Members liberally responded, and your Council is now enabled to present to each Member not in arrear the volume of Transactions before you.

R. P. Williams, Esq., having liberally placed at the disposal of the Council a number of plates of *Sebastes Norvegicus* and *Cottus Grœnlandicus*, drawn on stone by him from specimens exhibited in this Society, they have appended them to the Journal for this year, with a short account of the record of these rare fishes by William Andrews, Esq., your Honorary Secretary, who first detected their occurrence on the coast of Ireland. A long and detailed paper on the British Oniscoidea was read before the British Association at their late Meeting in this city, 250 copies of which the author liberally placed at the disposal of the Council for presentation to the Members, which it accepted and appended as a Supplement to the Journal: the Journal thus contains eleven plates and woodcuts of rare or new Irish animals.

Dr. Kinahan has kindly undertaken to receive the subscriptions of Members who may be anxious to subscribe to the fund for publication, and is empowered to dispose of copies of the Journal to Members or others requiring additional copies, at the charge of 1s. 6d. each to Members, or 2s. 6d. each to non-Members; these funds to be applied to the publication fund for next year.

Two important alterations were made in the Rules during the past Session,—one, passed at the Annual Meeting in November, having for its object the appointment of Vice-Presidents; the other, passed at the May Meeting, for the establishment of a new class of Members, called Associates, who, by the payment of the subscription of five shillings a year, enjoy all the privileges of Members, except the right of voting, thereby enabling every young naturalist who desires it to join the Society at a trifling expense. Your Council also suggested that Corresponding Members, on the payment of five shillings per annum, should be entitled to the Monthly Reports of the Meetings, and to the volumes of Transactions of the year, which also received the assent of the Meeting. These latter alterations were made too late in the Session to allow of your Council reporting on their utility or otherwise, but they feel persuaded that they must result in the more general spread of the work for which this Society was originally instituted, viz., the illustration and elucidation of the Natural History of Ireland.

During the past month your Council have entered into a satisfactory arrangement with the Dublin Chemical Society, who have agreed to hold their Monthly and other Meetings in your Society's rooms; all interference with the working of this Society, however, being guarded against.

One other subject demands notice, viz., the popular Meetings. Of these, one only was held during the past Session. This arose from a difficulty of procuring papers, chiefly dependent on the fact of most of your working Members being engaged in preparing for the reception of the British Association. The Meeting held was well attended, and your

Council would recommend a further carrying out of these Meetings in the ensuing Session.

So many years have now elapsed since this Society was founded, that your Council deem it necessary to review in brief the many important additions made to Irish Natural History through papers read before this Society.

In 1838, to meet a deficiency long felt in this country, the NATURAL HISTORY SOCIETY OF DUBLIN was founded, "having for its sole object the elucidation of the Natural History of Ireland, which it proposed to effect by forming a standard collection of species, and by holding Evening Meetings, at which original communications relating to the natural history products of the island might be read and freely discussed." That same year the nucleus of your present valuable Museum was formed, and increased so rapidly by donations (the value of a Museum, at that time the only one of its kind in the city in which duly authenticated specimens could be made available for comparison, being fully apparent to all), that your Society was soon compelled to remove their collection to apartments much more extensive than had been at first anticipated.

Whilst in the full career of its usefulness, the famine years caused in this, as in all societies solely supported by private subscription, such a falling off in its income, as compelled the Council in prudence to give up the rooms then held, and for some years the collections were not available for public inspection. The Monthly Meetings still continued to be held regularly, and many new facts were brought forward and valuable donations still poured in, so that when, on the return of prosperity to the country, your Society once more was in a position to exhibit its collection, it was found to be much increased in specimens of the rarer species, many of them then and still unique. Your Council, however, found itself still unable, through paucity of funds, to render the whole of the collections available, and therefore directed its attention, in the first instance, to those portions of the collection which, being of a comparatively perishable nature, required more immediate attention, hoping, as has indeed been the case, year by year to be enabled gradually to develop the other resources of the collection, and thus render it a complete key to the identification of the rarer Irish species.

Another matter also caused a drain on the funds, the great and steadily increasing value of the papers read before the Meetings pressing on the Council the necessity, in justice to the Society and the authors of communications, of providing some permanent and available form of Transactions, in which the claim to priority of discovery should be preserved, and published in a form suitable for general diffusion, and thus form by degrees Annals of the Natural History of the country. The Council, therefore, resolved to devote a portion of the funds of the Society to chronicling the discoveries brought forward at the Meetings, and has been enabled, through means of an advantageous agreement with the "Natural History Review and Quarterly Journal of Science," to publish in full authorized Reports of the Proceedings, which not merely enjoy the full advantages of the circulation of that

Journal in Great Britain, Ireland, the Continent, and America, but also at the end of each year enables your Council to present each Member with a full record of the progress made—advantages the importance of which must be apparent to all. These latter arrangements, which have now, as you are aware, been in existence for the last three years, entail on the Society, in conjunction with the rent and other necessary expenses of the Meeting-rooms, an expenditure of above seventy pounds, leaving but a very trifling sum to meet any extra expenses which may arise, and incapacitating the Council from expending on your Museum the sums necessary for its further development.

Your Council has, however, every confidence that it has but to call the attention of the Members, and Naturalists in general, to the importance of a still further increase to its means of usefulness, to obtain, by accession of new Members, &c., such support as will enable it to carry out the good work in which the Society has been for the past eighteen years employed, particularly as, there being no paid officers in this Society, the whole of its income is devoted to one object, viz., the illustration of the Natural History of Ireland, and affording every Irish naturalist a medium by means of which Irish discovery can be registered on Irish ground—a field of labour just as necessary now as when this Society was started, as no other Society or Museum in this country is devoted exclusively to Irish Natural History; and the numerous discoveries made through means of this Society prove, if proof were necessary, the full value of such local labour.

That during the several years of its existence, this Society's labours have not been without their fruit, the following brief summary of a few of the notices of species read before your Meetings since your foundation abundantly prove, and the list might be much increased:—

IN ZOOLOGY.—Vertebrata, forty-two species.

New to Ireland:—Mammals, two:—*Vespertilio Naterreri*, 1845; *Vespertilio mystacinus*, 1853.

Birds, six:—*Merula Whitei*, 1842; *Sterna leucoptera*, 1844; *Puffinus obscurus*, 1853; *Larus minutus*, 1840; *Tringa rufescens*, 1844; *Malocorhynchus membranaceus*, 1853.

Reptiles, one:—*Caretta caouana*, 1849.

Fishes, six:—*Orthagoriscus mola*, 1839; *Orthagoriscus oblongus*, 1845; *Cottus Groenlandicus*, 1850; *Sebastes Norvegicus*, 1850; *Polyprion cernium*, 1855; *Tetraodon Pennantii*, 1852.

Of the Mollusca, twenty-three:—

New to Ireland, eleven:—*Geomalacus maculosus*, 1842; *Amphipeplea glutinosa*, 1844; *Pholadidea papyracea*, 1850; *Pholas striata*, 1845; *Limneus glaber*, 1845; *Spirula Peronii*, 1845; *Bulla hydatidis*, 1845; *Teredo Norvagica*.

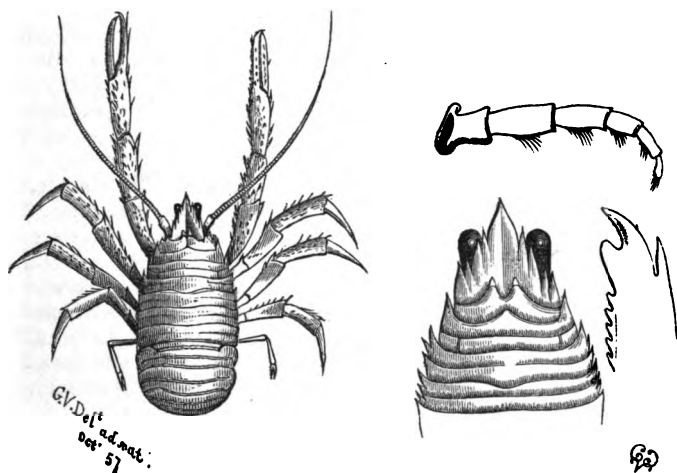
Polyzoa, three new species of *Plumatella*.

Of Articulata, twenty-one.

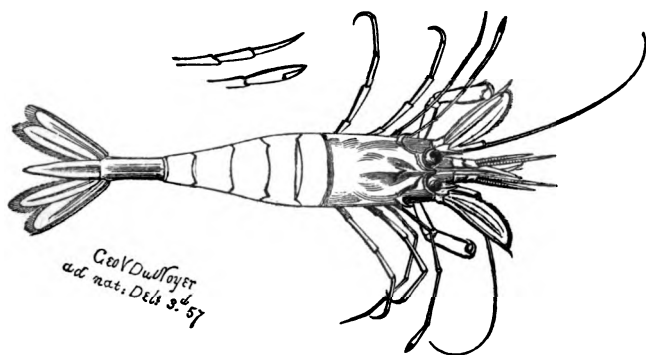
New to Ireland:—

Insects:—*Discomyza incurva*, 1854; *Hydrelia Banksiana*, 1854.

Crustacea:—*Portunus marmoreus*, 1845; *Thia polita*, 1845; *Portunus carcinoides*, 1856; *Galathea Andrewsii*, 1857; *Crangon Allmanni*,

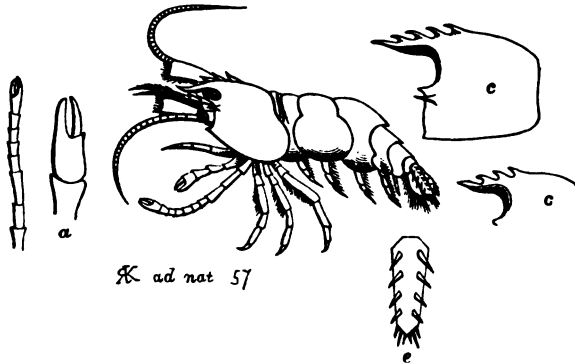


Galathea Andrewsii.



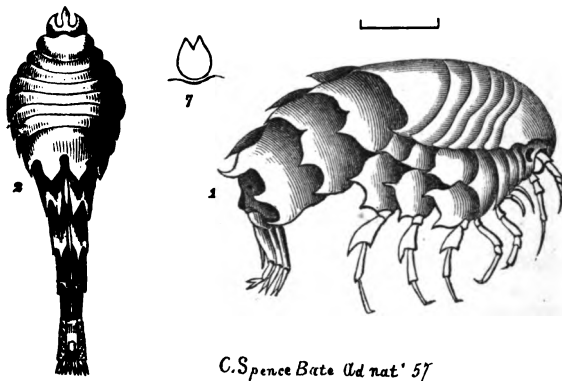
Crangon Allmanni.

1857; *Crangon trispinosus*, 1857; *Hippolyte pusiola*, 1857; *Hippolyte Mitchellii*, 1857; *Alpheus ruber*, 1857; *Iphimedia Eblanæ*, 1857; *Apseudes talpa*, 1857.



Hippolyte pusiola.

a, anterior pairs of legs; *c c*, rostrum; *e*, telson.



C. Spence Bate (Ad nat' 57)



Iphimedia Eblanæ.

Fig. 1, lateral view; Fig. 2, dorsal; Fig. 3, mandible; Fig. 4, maxilliped; Figs. 5 and 5a, first gnathopod; Fig. 6, second gnathopod; Fig. 7, telson.

Vermes:—*Eunice tubicola*, 1855.

Of Radiata, &c., seven; all new to Ireland.

IN BOTANY.—*Erica ciliaris*, *Potentilla floribunda*, *Arabis Crantziana*, *Lonicera xylosteum*, *Saxifraga Andrewsii*, *Spiraea filipendula*, *Simethis bicolor*, *Allium Babingtonii*, *Equisetum elongatum*, *Lophodium spinosum*, *Morchella esculenta*, *Polyporus betulinus*, *Nitella hyalina*, *Chara delicatula*, *Riccia natans*, *Riccia fluitans*, *Berkeleyana fragilis*, *Chordaria divaricata*, *Enteromorpha Hopkirkii*, *Tetraspora cylindrica*, *Staurocarpus cærulescens*, &c.

So that the positive number of additional species given to the world through this medium far exceeds 100.

These results cannot but be looked on as bearing your Council out in stating that the NATURAL HISTORY SOCIETY of Dublin has indeed fulfilled the expectations of its founders, and it confidently appeals to the volume now placed in the Members' hands as a proof that there has been no falling off in interest during the past year.

The Council, therefore, feels justified in making a strong appeal to the lovers of the science in this country, to come forward and grant such increased support as will enable the Society to carry out still further the object for which it was formed, by placing it in a position to illustrate papers recording new or rare species, and also to reprint such of the papers read in former years as deserve a more permanent and accessible record than the pages of a daily newspaper, especially as, by a law passed last session, every class of Members can obtain the yearly Annals of the Society.

The Museum of your Society at present contains, of Vertebrate Mammals, 18 species, 20 specimens (only partially displayed), two unique. Birds, 128 species (245 specimens), many of them rare, and several unique as Irish (nearly all exhibited). Reptiles, two species, one unique. Batrachia, 3 species (six specimens). Fishes, only about 20 species (40 specimens), 7 of these, however, of extreme rarity. The difficulty of preserving this group except as spirit preparations acts as a bar to a full representation of the group. A large and varied collection of birds' eggs is in the course of arrangement in this division.

Of Mollusca, a large collection is in possession of the Society, but not as yet arranged.

A nucleus of a collection of Insects has been formed during the past year.

In Crustacea the Society possesses nearly a perfect collection of Decapods: 58 species (109 specimens), which have been arranged during the past year, and there are many specimens of the other groups in course of arrangement.

The Radiata are represented by 24 species of star-fishes (42 specimens), partially arranged.

Zoophytes, a large collection, but unfortunately in a bad condition, and as yet not fully arranged.

The Mineralogical collection includes some fine specimens of rare

minerals, which have been during the past year fully displayed in the cases, and named according to the latest views.

It will be thus seen that those parts of the collection which are still deficient include chiefly objects which, requiring to be preserved as wet preparations, entail a necessary yearly outlay, which your Council does not at present deem advisable the Society should undertake. The rarer species will be almost all found in the collection, and when the funds permit a larger outlay of money, the Museum can be easily made almost perfect.

On the motion of the Chairman, the Report was unanimously adopted.

The Treasurer next submitted his Report, which showed that the total receipts to the credit of the account current was £64 10s. 7d., against which the expenditure has been £70 2s. 11d., leaving a balance of £5 11s. 4d. due to the Treasurer. He also reported that there were £79 to the credit of the reserve fund, which was an increase of £21 since the previous session, and that subscriptions to the amount of £28 were due by members.

This Report having been adopted, the ballot for officers next closed, and the Chairman declared the following duly elected for the Session 1857-58:—

PRESIDENT.—William H. Harvey, M. D., F. L. S., M. R. I. A.

VICE-PRESIDENTS.—His Grace the Archbishop of Dublin, Lord Talbot de Malahide, M. R. I. A., Sir Edward R. Borough, Bart., M. R. I. A., C. P. Croker, M. D., M. R. I. A.

COUNCIL.—John Aldridge, M. D., M. R. I. A., Henry M. Barton, F. W. Brady, Robert Callwell, M. R. I. A., James R. Dombrain, A. H. Haliday, M. R. I. A., F. L. S., Samuel Gordon, M. D., M. R. I. A., Rev. S. Haughton, F. T. C. D., M. R. I. A., Robert J. Montgomery, George B. Owens, M. D., Gilbert Sanders, M. R. I. A., Joseph Todhunter, E. Percival Wright, M. B., M. R. I. A.

TREASURER.—Richard P. Williams, M. R. I. A.

SECRETARIES.—Wm. Andrews, M. R. I. A., John R. Kinahan, M. D., M. R. I. A.

The Meeting having been made special for election of Members, after due ballot Willian Archer, Esq., 50, Upper Sackville-street, was declared duly elected as an Ordinary Member of the Society.

The Meeting then adjourned to the 4th of December.

FRIDAY EVENING, DECEMBER 4, 1857.

ROBERT CALLWELL, Esq., M. R. I. A., in the Chair.

The Minutes of the preceding meeting having been read and confirmed,—

Mr. Richard P. Williams, on behalf of G. A. Pollock, Esq., of Oatlands, announced the donation to the Society of a nearly perfect skeleton of the gigantic Elk (*Megaceros Hibernicus*), found at Dunshaughlin, county of Meath; presented by Richard Barnewall, Esq.

It was proposed by Mr. R. P. Williams, seconded by the Rev. Eugene O'Meara, and carried by acclamation—

“That in consideration of this very valuable donation, R. Barnewall, Esq., be constituted a Life Member of the Society.”

PROFESSOR J. REAY GREENE, Queen's College, Cork, read—

OBSERVATIONS ON THE DISTRIBUTION OF ACTINOIDA, WITH A LIST OF IRISH SPECIES RECORDED.

THESE remarks on the distribution of the Actinoida (Helianthoida) are made with a view of drawing the attention of the members to the great numerical discrepancy which at present exists between the *Irish* and *British* lists of these Zoophytes. Upwards of sixty species have already been found on the shores of Great Britain; whereas, the number which has hitherto been obtained on the Irish coast amounts to no more than twenty-two. Several of the more remarkable “non-adherent” genera, such as *Peachia*, *Edwardsia*, *Arachnitis*, are totally unrepresented in Ireland, though the geographical position of that country cannot be considered as in any way the cause of this deficiency, which seems due rather to the want of attention of Irish naturalists to this branch of Zoology than to any real scarcity of the animals in question. A correct list of the Irish Actinoida is very desirable, those hitherto published having been either incomplete, inaccurate, or both.

In vol. iv. of the late W. Thompson's “Natural History of Ireland,” the number of species given is only eighteen, and the notes of the different localities in which these have been observed are rather scanty, and by no means indicative of the relative distribution of the various species around the coast. We must remember, however, that the well-known accuracy of Mr. Thompson forbade him to publish the name of any locality of the existence of which any doubt could be entertained. It should be mentioned, that the name *Actinia gemmacea* in Mr. Thompson's list is meant to designate, not the Zoophyte now so called (*Bunodes gemmacea* of Mr. Gosse), but rather the common *Bunodes crassicornis*, of which it is a well-known synonym. Nine species of Actinoida are found on the Dublin coast, the neighbourhood of Howth furnishing the greater number of them. *Sagartia viduata* has been taken more than once in this locality, and the individuals of *S. dianthus* here ob-

tained exceed, both in size and delicacy of tint, the finest English specimens. It is on the western shores of our island that we are to expect the greater number of discoveries. Most of Mr. Gosse's novelties have been taken on the south-western coast of England, and it is highly probable that an equally diligent series of investigations, carried on round the corresponding districts of Ireland, will be attended with equally successful results.

Sagartia venusta, *S. parasitica*, and *S. rosea*, the first of these being one of the rarest and most beautiful of the Devonshire species, have been obtained by Mr. E. Percival Wright, in the autumn of the present year (1857), on the shores of Bantry Bay, during a very limited search which he made on this part of the coast; and we may readily assume that very many new forms yet await our investigations in this and similar localities. It should be borne in mind that ten years ago the number of British species amounted to but one-half only of what it does at present; and it is not too much to expect that the result of a few years' careful investigation on our more prolific western shores will lead to the discovery of many rare and unexpected species. The subjoined list may be of some use as a basis for future observations.

Irish Actinoida.

- Anthea cereus*, common round the coast.
- Adamsia palliata*, Belfast, Waterford.
- Corynactis viridis*, Crookhaven, Co. Cork.
- „ *Almanni*, Belfast Bay.
- Sagartia viduata* (*anguicoma*), Clare, Dublin, and Down coasts.
- Sagartia troglodytes*, Portrush.
- „ *rosea*, Bantry Bay (E. P. W.).
- „ *venusta*, Bantry Bay (E. P. W.)
- „ *parasitica*, Bantry Bay (E. P. W.)
- „ *bellis*, East coast.
- „ *dianthus*, all round the coast.
- Bunodes crassicornis*, all round the coast.
- Actinia mesembryanthemum*, all round the coast.
- „ *margaritifera*, Belfast, Donegal.
- „ *coccinea*, West coast (Dublin Bay ?)
- Ilyanthus Scoticus*, Balbriggan.
- Lucernaria fascicularis*, Donaghadee.
- „ *auricula*, Carnlough, Co. Antrim.
- „ *campanulata*, West coast, Portrush, Bray (?).
- Zoanthus Couchii*, Strangford Lough.
- Turbinolia millettiana*, Galway Bay.
- Cyathina Smithii*, Cork, Waterford, Dublin.

Mr. J. Reay Greene at the same time exhibited living specimens of most of the Dublin species.

PROFESSOR J. R. KINAHAN next exhibited specimens illustrative of—

REMARKS ON THE ZOE OF EURYNOME ASPERA, AND THE HABITS OF THE ANIMAL IN CONFINEMENT.

THE passage of the majority of the higher Crustacea through the zoe state is now a recognised fact in Zoology, and fresh species are turning up almost daily as zoes. That which is exhibited to-night is an example of this, as the zoe of any of the Lambridae, as far as I know, has never been described.

The specimens from whence the ova were obtained were captured during one of the minor excursions of the British Association, in a dredging party, formed through the kindness and liberality of that well-known and indefatigable naturalist, Robert M'Andrew, Esq., consisting of Professors Allman, Archer, Redfern, Rev. P. Carpenter, of Warrington, Robert M'Andrew, Esq., and son, Dr. Edwards, Mr. Hyndman, and myself. The scene of our labours was the Kish Bank, where, in addition to many other Crustacea, five specimens of *E. aspera* were obtained, two of them loaded with spawn.

These I placed in a small salt-water tank, changing the water occasionally. They were first placed in the tank on the 1st of September; the ova then being of a bright salmon colour. On the 7th I found that the ova in one of them had become much darker, being a dirty drab colour under the microscope, but little change could be detected in the appearance of their contents. On the 10th the ova were a much darker drab, and the black eyes of the zoes plainly distinguishable to the naked eye. The parent had all this time most assiduously kept up a perpetual current around and through the ova, seemingly by means of the pedipalps, at the same time keeping the mass in constant vibration by rhythmical up-and-down motions of the abdominal false feet, to which the ova were attached. She also sought the sunny side of the tank more than her wont now is. On the evening of the 12th the zoes could be distinguished coiled up in the ova, fully formed, and the motions for aëration were very vigorously carried on; and on examining the tank on the morning of the 13th I found it completely filled with many thousands of zoes, which kept together in one continuous swarm at the side nearest the light. These gradually increased in size, and also altered in their form, seeming so active and healthy that I was in hopes I might have been able to trace their complete changes; but unfortunately the second specimen of *E. aspera* died on the evening of the 17th, poisoning the tank, so that on the morning of the 20th I found my poor zoes dead, putting a stop to experiments as far as they were concerned.

The parent crab, however, still continues in health and vigour, although the water has not been changed till to-day for the last six weeks, and does not now consist of more than two pints in a circular tank, six inches in diameter, and although two green crabs, *C. menas*, during the time died from the poisonous effects of impure water. Its habits are interesting; it is but a sedentary animal; it seeks the light occasionally, generally, however, keeping to the shadiest part of the tank. At night it

is most active, running over the sides and bottom of the tank after the lights are extinguished, the noise it makes being considerable as it rattles over the glass. Its mode of feeding is sometimes most amusing. On its back, completely concealing it, is a large mass of sponge, which of course the crab carries about with it everywhere; it, however, causes these strange passengers to pay toll occasionally, as frequently I have seen the *E. aspera* stretching its long anterior limbs backwards over its carapace, and, deliberately tearing off a portion of the sponge, coolly proceed to tuck it in between its jaws; sometimes holding the piece of sponge in one of the chelæ, it daintily tears off small pieces from the mass, which it then quietly devours. I detected it once feasting on a little varying Hippolyte, *H. varians*, which was in the same tank; but generally speaking, its food must consist of the Entomostraca and other minute animals, &c., which abound in the water, and possibly also the *Ulva*. It is a most sluggish animal, slow and deliberate in its movements, and during the day remains with its back to the light in a lair it has formed under a projecting piece of *Ulva lactuca*, its long and beautifully carved arms kept semiflexed at some distance from each side of its body; and the whole animal perfectly motionless, except an occasional vibration of the foot-jaws, looking like some monster in his den. The species is not uncommon in moderately deep water on the banks around the coast, and I would recommend it as a good species to those who keep tanks, as it is generally tenacious of life, and bears travelling well, living for a long time, even in a small quantity of water.

My tanks, in which I have succeeded in keeping many of the rarer Crustacea, are so convenient, and their arrangement so simple, that I am tempted to describe them. They consist of a number of what are ordinarily called propagating glasses (the dealers call them pro'-glasses), six inches in diameter, and nine inches high; the only thing placed in them besides the water is the *Ulva lactuca*, selecting a broad piece unattached to stones, as I find that stones harbour dirt; the seaweed must be a large piece, as one of its chief intentions is to afford cover and shelter to the animals from the light. It requires to be occasionally renewed, as the animals feed on it. I seldom introduce Mollusca of any kind, as I find them troublesome by dying at unexpected times, and thus poisoning the tank, and I have never seen any occasion for their services in keeping my tanks either clean or healthy.

In this same tank I have had at various times, under the above conditions, the following rare Crustacea:—

Thia polita for four months.

Perimela denticulata, two months, hatched zoes, and was itself killed and partially devoured by *Thia*.

Hippolyte Cranchii, one month.

H. pusiola, one month.

Crangon fasciatus, three weeks; all killed by *Thia*.

The varying prawn (*P. varians*), two months.

Squill prawn (*P. squilla*), two months.

Common shrimp (*C. vulgaris*), three weeks.

Hippolyte varians, three months.

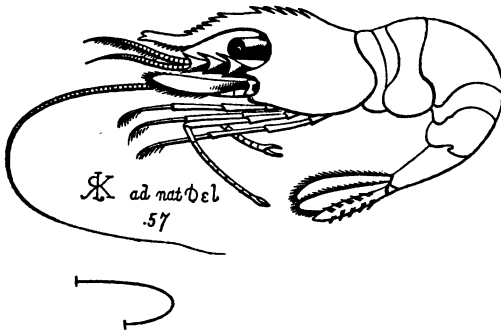
Most of them died merely through neglect in changing the water, which I generally do not oftener than once a month. The tank is kept in a shady place, and uncovered, and the animals are but seldom fed, and then as often on small snails or woodlice as anything else. The sea water for change is kept in a large bottle, with a narrow neck and transparent sides, closely corked, and sometimes, when used, has been three months or upwards in the bottle; so that the keeping of marine animals of the crustacean group is not such a difficult task as is commonly supposed,

The zoes differ from those of *Cancer pagurus* in having no lateral or frontal spines on the carapace; in having no spines at the inner angle of each joint of the abdomen below. The carapace is also very large; the abdomen is divided into six rings; the thoracic limbs are three (?), the most anterior hardly to be distinguished in form from the external foot-jaw of many of the Porcellanidæ.

A discussion arose regarding the practicability of growing Algæ in vivaria without a point of attachment. Professor Kinahan stated that *Uva lactuca* and *Enteromorpha intestinalis* both do well thus, but that he had found the latter Algæ, even when attached, a bad tank plant, as it is very apt to become yellow. He could not speak of any other species, as he found them to answer so well that there was no necessity for change; the brown weeds he had found were nearly certain destruction to many of the Crustacea.

Dr. J. R. KINAHAN read a paper—

ON THE OCCURRENCE OF A NEW IRISH ÆSOP PRAWN (PANDALUS), IN DUBLIN BAY.



BUT one species of the genus *Pandalus* of Leach has been hitherto recorded in Ireland. Last July (1857), I met a specimen which appears to be entitled to specific distinction: it occurred to me in a small sandpool in the zosteria bank at Sandycove, Kingstown. The shape of the beak is remarkably dissimilar from that organ in *P. annulicornis*, being much

N

shorter in proportion to the length of the animal, rounded instead of compressed at the sides, wanting the membranous dilatation on the under edge outside the eye, and hence, much shallower, and differently armed. It differs from the only other described form, *P. narwhal*, in having the superior anterior half of the rostrum free from spines or teeth. A third species has been recorded, but only a figure of it published by C. Spence Bate, F. L. S., in the "Natural History of Swansea," published in the "Reports of the Swansea Literary Society," under the name of *P. Jeffreysii*. I was at first inclined to consider my specimen this species, but an examination of specimens kindly furnished me by its describer, C. Spence Bates, led me to doubt the correctness of my first belief; that gentleman also appears to doubt it. I deem it better, then, to describe mine, provisionally only, under that name, at the same time suggesting the name *P. Leptorhynchus*, should mine prove distinct.

P. Jeffreysii (Spence Bate), according to a communication of his to me, is tolerably common in Scotland. The original specimens were taken in Oxwich Bay, Swansea; they were two in number, but imperfect at the time figured. They were described at the British Association Meeting at Edinburgh, but only the name published. Mr. Spence Bate has also taken it at Plymouth, and has received it from the Rev. Mr. Gordon, of Moray Frith, as a new species. Some of the specimens from thence have only seven teeth above and two below, instead of eight above and two beneath, which is the usual number.

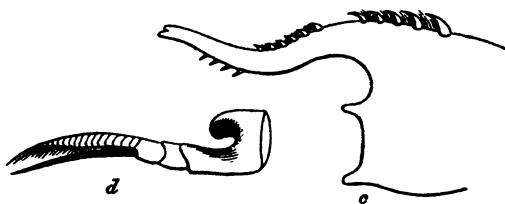
The specimen now described approaches closely *Hippolyte pandaliformis*, and affords another proof of the close affinity of the genera *Pandalus* and *Hippolyte*.

P. LEPTORHYNCHUS (mihl). *PANDALUS JEFFREYSII* (?) (*Spence Bate*.)

P. P. annulicornis affine rostro tenui subrecto vix carapacem dimidio superante undecim spinulis supra armato; infra quadri denticulato; apice bifido.

Colore : rubro.

Habitat : in zonam laminariam, "Sandy Cove," prope "Dublin."



c, rostrum, much enlarged; d, internal antenna, much enlarged.

Narrow-beaked Æsop Prawn.

Closely allied to *P. annulicornis*. Beak narrow, slightly turned up at end; scarcely exceeding half length of carapace; anterior half desti-

tute of teeth above, except a minute one near apex. Eleven spines articulated to the rostrum above; four distinct teeth beneath; interspaces between spines and teeth, with a few hairs; a well developed tooth at base of orbit, and a small one below; internal antennæ lobed at base.

Colour: clear uniform red..

Habitat: sandpools in *Zostera* bank, laminarian zone, Dublin Bay.

The spinules on the superior margin of the rostrum are articulated to it, as in *P. annulicornis*. Five of them are large and hooked, and situated on the carapace, the fifth being at the edge of ocular notch; there is then a moderately wide interspace: the remaining six spinules being crowded together, and rapidly diminishing in size. The inferior teeth very minute, and situated near the apex of rostrum; there is no dilatation in the rostrum anterior to the ocular notch below, and a nearly total absence of the setæ which so thickly adorn the interspaces of both teeth and spinules in *P. annulicornis*. In habits, the animal resembled *H. varians*, in company with which it was taken.

The beak in typical specimens of *P. Jeffreysii* is straight.

The Meeting then adjourned to the 8th of January.

FRIDAY EVENING, JANUARY 8, 1858.

PROFESSOR W. H. HARVEY, M.D., M.R.I.A., F.L.S., President,
in the Chair.

THE Minutes of the previous Meeting having been read and confirmed—

Mr. R. P. Williams apologised for the unavoidable absence of Mr. Andrews, owing to which Lord Clermont's communication, relative to the Mute Swan, was postponed. He had to present, on behalf of Lord Clermont, a specimen of the mute swan (*C. olor*), captured under circumstances which left little doubt of its being a truly wild specimen (*vide* "Proceedings" for February, 1858, *postea*).

A special vote of thanks was passed to Lord Clermont for his donation.

Mr J. B. Doyle submitted to the Society a communication he had received from his friend, Robert Evatt, Esq., Mount Louise, an observant naturalist, in reference to the habits of the mute swan, whether it was known that the male bird assisted and relieved the female bird on the nest during the season of hatching? He had observed the male swan preparing the nest, and sitting on it, previous to the eggs being laid by the female; but, although he had for some time been watching, he never could detect the male swan in the act of incubation, until one evening, rowing over to the island, he found him actually on the nest, the female not being in sight—the bird was sitting, at the time, on six eggs. Although he had been endeavouring for twenty years to breed swans, he had

never succeeded until lately—the eggs never maturing—until he constructed a kind of hut with poles and fir branches over the nest, and with this protection he succeeded in rearing young birds. Thunder or very stormy weather was apt to destroy the young birds in the eggs unless shelter was formed over the nest. Mr. Doyle wished for information on these points from the experience of any of the members.

Mr. Robert John Montgomery observed that the habits of the mute swan had long been familiar to him, and that he had constantly seen the male bird on the nest hatching. He was surprised to hear that any difficulty had been experienced in hatching the eggs. He always found them extremely prolific, and managed with very little care.

Mr. R. P. Williams confirmed the fact of the male swan generally assisting the female in her duties.

Rev. E. O'Meara exhibited some most interesting specimens of organic remains from the Cambrian rocks of Bray Head, consisting of diatomaceous frustules and spicules resembling those of sponges. The specimen of rock operated on was given him by Dr. Carte, and seemed to consist of a mass of Oldhamia, regularly matted together. He experienced much difficulty in operating on it, owing to the great quantity of amorphous silica present, which it was impossible thoroughly to remove. Every slide of the deposit he examined contained specimens of diatoms as well as the spicules.

Professor Kinahan thought it might be interesting to the Meeting to know the exact locality of the specimen acted on. It was from the mass of green beds described by him in the Journal of the Geological Society of Dublin some time since, and were composed, as the Rev. Mr. O'Meara had stated, of a matted mass of *Old. radiata*, which had evidently been floated into some quiet nook of the Cambrian sea, and settled down there, the zoophytes bearing on their stems diatomaceous forms exactly as we find their allies, the sertularian zoophytes of our own seas, loaded with living forms of Diatomaceæ. Mr. O'Meara's discovery was one of great importance, as everything which tended to throw light on the nature of these ancient deposits was of great value to the geologist, and it being found that at the present day diatoms of different and often distant localities are identical, we may be, perhaps, able, by an examination of similar deposits in Wales, to obtain another link in the chain of evidence as to their identity or not with Irish Cambrians.

MR. ROBERT JOHN MONTGOMERY read the following—

ON PECULIARITIES IN THE HABITS OF THE STARLING (*STURNUS VULGARIS*).

MANY members present have, I dare say, witnessed the very remarkable gathering of starlings (*Sturnus vulgaris*), for the purpose of roosting, during the winter months, in the Gardens of the Royal Zoological Society in the Phoenix Park, and to which the late Dr. Ball first directed attention, through the means of the public press, in March, 1845, estimating their numbers at from 150,000 to 200,000.

Although the great starling roost which I had the gratification of visiting in the county of Donegal, in the commencement of this winter, was far, far inferior, in point of numbers, to that in the Phoenix Park, yet I thought it of sufficient interest to make a note of at the time, and that note I now have the pleasure of submitting to the Society.

I went to Lough Fern, a beautifully situated sheet of water, of about three miles in length, on the 19th of November last, with a friend, an ardent lover of ornithology, the Rev. Robert Harvey. Our principal object in going was, to ascertain how many species of Anatidæ frequented the lake. At the western end of the lough there are immense beds of reeds (*Arundo phragmitis*), standing many feet in height out of the water. Near to the inner edge of these I took my position to have a shot at the evening flight of ducks.

Shortly before dusk we remarked small parties of starlings begin to arrive. These circled about over the reeds, every few moments receiving considerable accessions to their numbers. Presently, larger bodies made their appearance, and, joining their comrades, formed one immense flock. This flock then split into two companies, one circling over the reeds on the northern side, and the other, apparently endeavouring to rival their friends in the beauty of their aerial evolutions, on the southern side; sometimes rising to a considerable height, and forming the most beautiful figures against the clear evening sky; then again making a downward rush, until the *sough* of their wings resembled the roar of a mountain torrent, they would disappear amongst the reeds; for a moment all would be still—no sound to be heard but the mournful sigh of the wind through the tall reeds, the whistle of the widgeon (*Anas penelope*) far out on the lough, or the call of the partridge in the adjoining fields; when suddenly a strange guttural chatter would strike upon the ear, overcoming every other sound. This would continue a few moments only, and then, with a noise like a tempest, would the mighty flock arise once more.

These evolutions continued until it was pretty dark, when the immense multitude finally settled among the reeds. The estimate I made of their numbers, at the time, was 18,000 or 20,000; but since then I have come to the conclusion that they far exceeded that amount.

In reply to inquiries I have since made, I find that they have resorted there for a great many years; that they have latterly, especially this winter, greatly increased; they commence coming there for the purpose of roosting about November, and disappear by degrees in spring. I observed in several parts of the country, though many miles from Lough Fern, parties of starlings, towards evening, all flying in the direction of the lough, and my friend, Mr. Harvey, tells me he has observed them in the morning flying apparently from it.

What surprises me is the fact of their continuing to frequent the same place for so many years, as I have, in every other instance which has come under my own observation, found the starlings very capricious with regard to their roosting-place. I have known several instances in Donegal and other counties of their frequenting a place for some years, and then to-

tally deserting it, apparently without cause. Thompson mentions some similar cases. I remember in the county of Louth, during the intense frost in the winter of 1855, I observed on several occasions immense flocks of starlings towards evening, all flying in the same direction; they amounted to many thousands, and were evidently a migration into that part of the country. I watched them with very great interest, and found that during the severe frost they nightly congregated in a place called Ballydonnell, where they roosted among evergreens and small trees. Why they selected that place I am at a loss to know; it is only half a mile from the extensive old woods and plantation of Beaulieu, which they actually passed. I never saw them in great numbers there before that winter, nor have I seen them since.

Mr. J. B. Doyle observed that two instances illustrative of peculiarities in the habits of the starling had come under his notice. When in Wicklow some years since, shooting, in the latter end of August, between Wicklow and Seapark, in a cover adjacent to the sea, his attention was attracted by an unusual noise and chattering, which, on emerging on the strand, he found to proceed from an enormous multitude of starlings congregated in the trees, evidently having just arrived in migration; it appeared, however, that this was an unusually early migration of these birds. The other instance had reference to the fact that the starlings do not confine themselves to the one kind of roosting ground. At Dunran, county of Wicklow, they roost in old ruins. In 1839, after the great storm, at Mr. Templeton's, Waterton Demesne, he saw numbers of them dead and wounded among the trees, killed by the clashing of the boughs against one another. On inquiry he found that the beech trees there were their usual roosting-place.

The Chairman then declared the following duly elected:—

Ordinary Members:—Joseph Reay Greene, Professor, Queen's College, Cork; George Dixon, Esq., Dublin; William Hodges, Esq., Rathgar.

Corresponding Member:—The Rev. Robert Harvey, Leck Glebe, Letterkenny.

The Society then adjourned till the 5th of February.

FRIDAY EVENING, FEBRUARY 5, 1858.

PROFESSOR W. H. HARVEY, M.D., M.R.I.A., F.L.S., PRESIDENT,
in the Chair.

MR. WILLIAM ANDREWS, Honorary Secretary, read the following—

NOTES ON THE CAPTURE OF A MUTE SWAN (CYGNUS OLOR) IN DUNDALK BAY.
BY LORD CLERMONT.

THE mute swan, which I have the pleasure of presenting to the Dublin Natural History Society, is interesting from having been taken under

circumstances which favour the supposition that these birds occasionally visit our shores in a truly wild state. It was shot on the 27th of February, 1857, in Dundalk Bay, about a mile from the land, out of a flock of six, by a fisherman in my employment, who observed the swans flying over the sea, and alighting on it. He then put off in a boat, and succeeded in getting within shot of the flock. All the birds had, he said, some brown plumage.

The fact of these birds being strong on the wing, and coming in from seaward, does not look like birds reared on a lake or river. There have been flocks seen in Belfast and Strangford Loughs each winter now for three successive years, several individuals of which have been approached and shot like common wild swans; and as several instances of the occurrence of the mute swan wild in France and Belgium are given by De Selys Longchamps, and Degland, Yarrell, too, admitting that they occur wild in nearly every country of Europe,—I see no difficulty in concluding that this species, like the two others, is at times impelled by the severity of a northern winter to seek a milder climate on the more temperate shores of the British islands. Nothing is more probable at all events; and although their wandering habits when half tame justify suspicion and inquiry into the particulars of each case, there does not seem to be any reason, when these favour the wild theory, why it should not be accepted where there is so little difficulty in doing so. However, not being a very experienced ornithologist, I submit my views subject to correction.

Mr. Andrews said that this specimen, so kindly presented to the Society, could not, under the circumstances given by Lord Clermont, be otherwise received than as truly wild,—no records of the capture of the mute swan (*Cygnus olor*), in the British islands admittedly wild, have been given, but there was not any possibility of considering this as anything but a visitor in a wild state. It appeared to be a bird of the first year; and although from its large proportions it might bear some affinity to the Polish swan, yet there were sufficient characteristics to separate it from *Cygnus immutabilis*, and to identify it as a yearling of *C. olor*.

Rev. Professor Haughton exhibited some specimens of plant stems, found in the micaceous yellow sandstone beds of Herrylock, county of Wexford, on the east shore of Waterford Harbour. (Figures and descriptions of these will be given *postea*.)

The President observed that the stem of the grass tree of New Holland (*X. hastilis*) exhibited just such a section as that described, the cross lines being formed by the bases of the old leaves, and the mid-axis by the stem of the plant. He had also seen specimens of parasitic plants, such as ivy, which might explain the other specimens exhibited, in which the twining plant had become imbedded in the bark of its support.

Dr. J. R. KINAHAN next read a paper, as follows:—

ON THE SUBAQUEOUS HABITS OF THE WATER OUZEL (*CINCLUS AQUATICUS*).

DURING the years 1849 and 1850, having nearly daily occasion to frequent that part of the river Dodder which passes through the romantic mountain glens of Glenismaul and Castlekelly, the great abundance of the water ouzel, or, as the peasantry there call it, kingfisher, induced me to study its habits somewhat particularly. The results of this investigation were brought by me before the Dublin Philosophical Society at its opening meeting in the latter year. That communication never having been printed, I purpose to lay before this Society to-night the more important conclusions to which I was then led, the accuracy of which a frequent study of the bird in the counties of Wicklow, Waterford, Galway, Tipperary, Clare, and Tyrone, have but confirmed me in, and which also, as far as I can learn, have never been fully recorded by any of our authorities.

The general habits of the water ouzel have been so well and so often described that they need not detain us; but although it is now some years since M. Herbert announced the fact that this bird is possessed of the power of walking under water on the bottom of streams; and although the truth of this observation has been strengthened by the evidence of such men as St. John, Dilwyn, Rennie, William Thompson, and M^cGillivray, yet still there are found many (especially among the closet naturalists) who prefer to ignore the fact altogether, or else assert that this bird's habits in this respect are identical with those of other divers.

My observations, made repeatedly during many months, and having for their object the elucidation of this very point, enable me to corroborate M. Herbert's account in every particular, except that the bird carries down a supply of air to the bottom enclosed within its wings, in which he most certainly is in error, led away by a fancied analogy between the bird and diving beetles, as I have repeatedly seen them rise to the surface to obtain air, which they do exactly like a grebe, merely raising the tip of the bill out of the water.

The bird has several modes of diving. When seeking food it generally goes down, like most divers, head foremost in an oblique direction, or else walks deliberately in from the shallow edge of the pool, the head bent down, and the knees (tarsal articulation) crouched. When seeking refuge, however, it sometimes sinks like a stone, exactly as the great northern diver (*C. glacialis*) has been observed to do—that is, gradually, the top of head the last part submerged, without any apparent exertion, sometimes in the midst of its most rapid flight dropping down suddenly into the water like a plummet. Its course is indifferently with or across the stream, rarely against it.

It often remains under water totally submerged for fifty seconds and upwards, and during that time will proceed from ten to twenty yards. When it comes out, the water may be seen running rapidly off its plumage.

It swims with great rapidity, and appears to rejoice in the water as its true element, hardly ever alighting directly on a rock, but even after its longest flight splashing slap into the water, at the base of the stone selected as a resting-place, and then scrambling to the summit of this. In its motion in the water it more closely resembles the jackass penguin of Cape Horn (*Apt. chrysocoma*) than any other aquatic bird I have had an opportunity of studying. Like that bird (especially in the breeding season), the ouzels may be seen at times leaping right out of the water in their gambols.

That the bird actually does possess the power of motion under water, the following notes on a wounded bird, made on the spot, abundantly prove:—

“Nov. 29, 1850.—Bohernabreena. Wounded a water ouzel which, as I observed them all to do, immediately made for shore. On my going to seize him, he darted into the water, running slap in; waded in after him; under water he looks quite glossy, but does not seem increased in bulk, the glossiness probably arising from the oiled state of the plumage, or else from its peculiar texture. When I first got up with the bird he was perfectly stationary at the bottom, not using any exertion to remain there (this remark applies to two other birds wounded later in the day, which also took to the water). The bird next got under a big stone, and when I poked him out on one side he ran to the other—after the lapse of a minute or so he put his head out of the water to breathe, always keeping the stone between him and me, and when I tried to catch him he would dodge under the water again, and come up on the other side.

“Finding that I was still chasing him, he took to the stream, and went under water faster than I could follow him; he seemed to move now altogether by means of his feet, his wings hanging down behind his tail, though his motions were so quick it was difficult to be positive as to the latter part of this observation. At times he swam in mid-water, using his wings, crossing the current several times, and seeming but little incommoded by it.

“All at once he turned over on his back—still possessing the power of continuing under water—struggling to regain his original position, he spun round and round; it appeared as though the wounded wing had suddenly failed him, and thus prevented his preserving a due equilibrium in the water. At length he came to the top, when he immediately righted and swam as at other times; everytime I tried to lay hold on him he again ducked and dived down to the bottom, at first all right, and then the tumbling began again. When captured at length, I found him merely winged.”

I was enabled to confirm these observations several times that day, as I obtained seven specimens, five of which necessitated a watery chase before I succeeded in catching them, and one got clear off. I ought to explain such seeming needless cruelty in shooting so many of these harmless birds, but the specimens were required for a series of dissections at that time in hands.

From these observations it would appear that both feet and wings are used in progression, the latter in mid-stream (when the bird almost looked as if it were flying), the wings doubtless being also of essential use in preserving a proper balance in the water, probably acting like the pectoral fins of the fish. The bird's progression along the bottom was certainly by means of its feet alone.

Like many water animals, the sensation in this bird appears blunted; at least, two of those I winged and afterwards captured sat coolly looking at me, as though uninjured, without leaving their position, perking and jerking their tails, and "checking" at me as unconcernedly as possible, so that, had I not had some confidence in my aim, I should certainly have taken a second shot at them. The stomachs of all those I examined contained only insect remains.

This bird is extremely common in our mountain glens. I have counted as many as ten broods in Saggart Slade, and, although called an unsocial bird, it is to be always found in pairs. These certainly keep apart, but many pairs will be met in favourable localities in a very limited area. They keep nearly altogether to the glens. I saw the bird but once below Rathfarnham Bridge in the Dodder. This was at Dartry, at the circular weir. Surely, the fearlessness and curious manner of this bird, the harmlessness of its habits, the adaptive power displayed—in the elongated valve-like opening of the nostrils, the absence of gape-bristles, the partial webs to its feet, the dense peculiar nature of the plumage, and the general dissimilarity between it and the other thrushes, form a group of characters which, taken in combination with the wild and romantic nature of the scenes it mostly loves to frequent, ought to render this bird as great a favourite with the field student as it generally is with the fisher, plying his lonely task amidst its secluded haunts, and hailing as an old acquaintance the tidy little white-breasted water-blackbird, as it sits jerking and posturing on a rock amidst the boiling waters, swimming on the eddying current, diving beneath the depths, chattering to its mate, or enlivening the mountain glen with a simple but plaintive strain to the fitting and appropriate accompaniment of the ceaseless babble of the sparkling waters of the gushing mountain rill.

The Honorary Secretary read a communication as follows:—

DESCRIPTION OF A STARLING ROOST AT RATHKEALE, COUNTY OF LIMERICK.
BY G. HENRY KINAHAN, C.E. T. C. D., CORRESPONDING MEMBER, G. S. I.

THE following brief account of a starling roost at Rathkeale may be of some interest to the Society, as a pendant to Mr. R. J. Montgomery's paper, read at your last meeting.

To the north-east of Rathkeale village, county of Limerick, there are two lakes, the larger of which is called "Doohyle Lough;" at the east side of this there is a marsh running E.N.E., and W.N.W. Last winter, my work lying that way, I had occasion to pass it frequently.

Coming home late one evening after dark, I was surprised, whilst walking along the road to the north of the lough, to hear a tremendous chattering, which would sometimes suddenly cease, and one heard a long continuous whirr, like that of a strong rushing wind. It was then too dark to see anything, and although I knew they must be birds, yet their kind I could not say. I could hear the whirr, caused by the flocks getting up, nearly the whole way into Rathkeale (over a mile). The next day, on returning the same way, the noise of the preceding night was fully explained by my seeing innumerable starlings congregated about the lake.

Some evenings afterwards I went on purpose to watch the birds; I arrived at the spot about half an hour before sunset, and immediately afterwards the stares began to arrive in flocks of three and four hundred. The first flock flew round the lake, and then lit in a field to the south; a few minutes more, and another flock arrived, which, after flying round the lake, joined the first comers; these immediately rose, and all took a circuit round the fields, and then alighted again.

Flocks now came in thickly from all sides, the same performance being gone through at each arrival, until the flocks began to come so fast that they had no time to remain on the ground at all. The main flock then adjourned to the lake; arriving there, it took two or three circuits of the lake, and then alighted among the reeds; the arrivals now were not so numerous as they had been, but many flocks still came in, and each arrival was the signal for a general move and promenade as before. This procedure was kept up till about half an hour after dark, and then ceased, so that I presumed all had arrived in that time (two and half hours). When I left, a constant chattering and gossip was going on among the reeds.

I could form no accurate estimate of the numbers that were there, but the reeds on the north of the lake are about a quarter of a mile long, and two hundred yards wide, and every reed seemed to have a half a dozen on it. I could always tell, ever afterwards, when it was getting late by seeing the starlings going Doohylewards.

With regard to the breeding-place of starlings—in the Court-house square, Rathkeale, at the reere of one of the dwellings, there is an old pigeon-house, in which a lot of starlings build; and the owner of the house says that they remain there summer and winter. I saw them there in the spring, I suppose over forty of them, just as tame as pigeons about the yard and house.

[Since my last communication I find that the stares have left Doohyle, chiefly, I think, on account of the shooting parties (nearly every evening there after dusk) this winter. When I found Doohyle was deserted, my curiosity was aroused to discover their present abiding place. I, therefore, watched the flights every evening, and found that they were in a direction to the west of Newcastle. Knowing the country well thereabouts, I thought it might be in one of the planted glens in Coal-measure Hill, no lakes being in that quarter; and on com-

ing home that way the other evening, I found, as I had expected, the stares assembling in a young fir plantation, in a deep ravine due west of Newcastle, and about one mile to the north of Barnagh Hill. On the road from Newcastle to Abbeyfeale I have observed the birds going to their roost; from Abbeyfeale, ten miles to the west; from Shanagolden, eight miles to the north; and from Rathkeale, eleven miles to the east. The flights occur about sundown.—G. H. K., Rathkeale, Feb. 24, 1858.]

Dr. Kinahan thought the communication just read most interesting. It would be advisable if observations were to be made in all the different parts of the country which these birds frequented, as to whether, as had been stated by Mr. R. J. Montgomery in his paper on the last evening, starlings returned to the same roosting-place each year. There were many points of interest connected with the habits of partial migrants—that is, such birds which, as the wild duck, snipe, starling, &c., were resident in small numbers in this country throughout the year, but received a great accession to their numbers in the winter months; and perhaps not the least interesting would be to ascertain whether they, like the gregarious summer visitants, return to their old localities or not.

Mr. Grubb exhibited a microscope of his own construction, which combined a steady stage, the power of placing the tube in either a vertical or horizontal position, and of applying every kind of illumination seriatim, without taking the eye off the object. He entered fully into the history of the improvements introduced in illuminators as regarded illumination, and the azimuth as regards the object, explaining the nature of Shadbolt's illuminator, as modified by Mr. F. Bergin, the objections to the method, and his own improvement of a mirror revolving on an arc.

Mr. Grubb explained and exhibited to the Meeting a series of beautiful manipulations illustrative of the improvements in the microscope he had made.

After the ballot, the Chairman declared Henry P. Heney, Esq., duly elected Ordinary Member.

The Meeting adjourned to the first Friday in March.

FRIDAY EVENING, MARCH 5, 1858.

R. CALLWELL, Esq., M. R. I. A., in the Chair.

THE previous Minutes having been read and confirmed,—

Professor Haughton exhibited specimens of *Lepidomelane* from the county of Donegal.

PROFESSOR KINAHAN, M. D., read the following:—

ON THE DISTRIBUTION OF FERNS IN IRELAND, WITH A LIST OF SOME OF THE MORE REMARKABLE LOCALITIES IN WHICH THEY OCCUR.

DURING the many years which have elapsed since the publication of Mackay's "*Flora Hibernica*," the ferns have received so much attention in the British Isles, and as a natural consequence the list of them has been so much increased by the discovery of unrecorded species, and the identification and discrimination of others, as to render the list of them given in that valuable book necessarily imperfect, and of comparatively little use to the student. Having been engaged, since 1848, myself, in their study, and had opportunities of collecting in almost every quarter of the island; and also having had, through the kindness of friends in England, opportunities of examining in a living state, authenticated specimens of all the disputed or critical species, I propose to print a list of the more important localities in which the several species have occurred.

To enumerate all the localities in which common ferns occur would swell the list to an inconvenient size. To such species as are of general occurrence, and equally abundant in suitable stations, the simple remark, "general," is appended; fuller details being given in the case of such species, as by their markedly special distribution, or peculiarity of growth in certain localities, seem to be of geologic value; the word 'geologic' here, and generally throughout this paper, being used, not in the confined sense of the class or character of rock or soil, on which the plants are found, but rather in the more extended and general sense—of distribution from a geologic centre of creation.

The districts examined by me are—

For the North, the counties of Tyrone, Fermanagh, Monaghan, and Armagh.

For the West and South-west, Galway, King's County, Clare, Westmeath, Queen's County, Kilkenny, Tipperary, Limerick, Kerry, Cork, and Waterford.

For the East and South-east, Louth, Meath, Dublin, Kildare, Carlow, Wicklow, Wexford, and Cavan.

There are no sufficiently marked features in the central counties to call for a separate division. I have not had an opportunity of examining the Far North, my researches not having been pursued further north than Tyrone. Wexford, in the South-east, I have never examined, but some years since a friend of mine, since dead, Thomas Barry, Esq., forwarded me a large collection of fresh fronds from this neighbourhood, which enabled me to learn that its Fern Flora much resembles that of the counties immediately adjoining. The stations examined by myself in the following list are either marked with my initials, or left unmarked. Those supplied from other sources are between inverted commas, the letters q. v. being added in cases in which I have seen the actual specimens.

Ophioglossum vulgatum (Linn.). Adder's Tongue.

Tipperary: Annagh Inch, along Little Brosna and Pallas Rivers. Kerry: Beginnish Island, Lough Kay, Valentia, J. R. K. Meath, G. A. Pollock, Esq. Dublin: Dodder Valley, Kilnasantan, J. R. K. "Wexford; Rathcormack," Thomas Barry, Esq., *q. v.*

Appears to be generally distributed in all parts of the island, having been recorded from near Belfast by Templeton; its small size, and capricious mode of growth, one year abundant, the next not to be found, probably accounts for its absence from so many of the local lists. It does not grow near so luxuriantly here as in England.

Botrychium lunaria (Linn. sp.). Moonwort.

"Tipperary: Clonmel," E. H. Sargent, Esq., *q. v.* "Louth," G. A. Pollock, Esq. "Kerry: Valentia Island," Miss Helen Blackburne. Dublin: Kilmashogue Hill. Here also grows a singular deltoid form (*vide* "Nat. Hist. Review," vol. iii., "Proceedings Nat. Hist. Society"): Kilnasantan and Cruagh Hills, J. R. K. Wicklow: Scalp, J. Bain, *q. v.*

The short period of this plant's appearance above ground, and the localities it frequents—open elevated pastures and heaths—doubtless contribute to render it rare in our lists. It has been obtained in the county Antrim, and grows as luxuriantly here as in England.

Osmunda regalis (Linn.). Royal Fern.

Galway. King's County: All Saints bog, rare. Clare: Lough-a-torrig, local. Kerry, common. Waterford: Portlaw, Ardmore. Wicklow: Devil's Glen, rare, J. R. K.

From the above, it will be seen to be generally distributed, though often local. It is most luxuriant in the west and south, especially near the sea, where a stunted form of it grows down often within the high tides line. In Dublin it is extremely rare. The only station I ever heard of, that given by Mackay, appears to be now extinct. I have often searched there unsuccessfully for it.

Blechnum spicant (Linn. sp.). Northern Hard Fern.

Common and general, growing alike in mountain range, and elevated lowlands, and bog; it flourishes even amidst the sea spray in some localities. I have met it in every locality I have been in. A crisped subform of it is worthy of notice.

Pteris aquilina (Linn.). Common Brakes.

Common and general, but most affecting lowlands or sheltered glens.

Polypodium vulgare (Linn.). Common Polypody.

Common everywhere from lowland glade to the summit of our wild-est hills. I have met it 1800 feet above the sea level, in the wild gorges

of the county of Wicklow and county of Limerick, luxuriantly growing. The plant on the exposed ridges small and stunted, but wherever there is the smallest shelter, its growth is most luxuriant and beautiful.

Gymnocarpium phegopteris (Linn. sp.). Beech Fern.

Kerry: Killarney, Torc mountain, very abundant. Wicklow: Waterfall, very scarce, J. R. K.

This fern has been recorded from Down and the north, generally; it is by no means so abundant here as in England.

Cystopteris fragilis (Linn. sp.). Bladder Fern.

Galway: Gort, J. R. K. Clare: Burren, J. R. K.

Though recorded from Wicklow and Dublin, careful research in this latter locality, and in many parts of Wicklow, has been unrewarded on my part. I have never met it except in the west and north-west, where it is tolerably abundant.

Polystichum aculeatum (Linn. sp.?). Broad Prickly Shield Fern.

Tyrone: near Aughnacloy, not rare. Monaghan: ditto. Galway: very common. Clare: Feakle, rare. Tipperary: near Birr, very rare. Kerry: rare, local. Dublin: very local and rare. Kildare: very abundant, Levittstown. Carlow: ditto. Queen's County, Maryborough, J. R. K.

I have been particular in noting the localities of this and the following species, as they are often confounded. It is an extremely local species, commonest in the south-west; it, as far as I can learn, frequents lowlands chiefly. In Dublin it is one of our rarest species. It would appear to be a plant of most peculiar growth, which, perhaps, accounts for its very disjointed distribution over the country. The form met near Feakle differs so much in character from the ordinary plant, that I have some hesitation in positively considering them identical, being much stunted and narrower in its form, and retaining this character in cultivation. It grows as luxuriantly in Galway as anywhere in Cheshire.

Polystichum angulare (Willdenow sp.). Angular Shield Fern.

Tyrone: Omagh, extremely rare. Aughnacloy: rare. Galway: abundant. Dublin: extremely abundant, J. R. K. Kerry: very abundant. Tipperary: Annagh Inch, local, scarce, J. R. K.

This species, unlike the last, is generally diffused and most abundant commonly; the county of Tyrone, at its northern extremity, is an exception. I could only find one plant near Omagh and at Aughnacloy; though the plant occurs, it is far, very far, from common or abundant; in fact, it appears to me to be less abundant in the north than in the east, where it is one of the most characteristic ferns. In west or south I have not thought it necessary to multiply localities.

Lastrea montana (Vogler sp.). Mountain Fern.

Tyrone: Gortin Gap, sparingly, 1857. Galway. Clare: Feakle, very abundant. Kerry: Killarney, scarce. Waterford: Clonmel, scarce. Dublin: Dodder Valley, local. Wicklow: Lough Breagh and Glendalough, J. R. K.

This fern is very local, but, for the most part, abundant where it occurs. It cannot, however, be called the common fern of any of the districts recorded except Clare; it is the inhabitant in that country of wild mountain sides, near Lough Graney. The deciduous growth of its fronds has, doubtless, caused it to be often overlooked. It appears to be commonest in the west.

Lophodium Fenesecii (Lowe sp.). Bree's Fern.

Tyrone: Omagh, common. Monaghan: common. Galway: very common. Clare: abundant, but local. Tipperary: rare. Kerry: very common. Kilkenny: Piltown, common. Waterford: Curraghmore, very common. Dublin: extremely rare. Wicklow: Glendalough, very abundant; Sugarloaf, rare, J. R. K.

This well-marked species, as will be seen from the above list, is one of the most commonly diffused ferns in Ireland, being in fact a most characteristic plant of the west and south. On the other hand, in Dublin, and the counties more immediately adjacent thereto on the north-east, it is extremely rare. I know of but two localities in which it occurs in Dublin—Howth, and Glasavullawn, in the Dodder Valley.

Lophodium multiflorum (Roth sp.). Roth's Fern.

Generally diffused and abundant. It is one of the characteristic ferns of the east and north-east, especially in the bogs, replacing Bree's fern of the west.

Lophodium spinosum (Roth sp.). Withering's Fern.

"Monaghan: Dartrey, Rev. Mr. Lovatt Darbey; auct., Newman's British Ferns." Tipperary: bog drains, Annagh Inch, near Birr. Waterford: Curraghmore, Portlaw, 1858, J. R. K. I believe I also got this species near Cahirciveen, county of Kerry, 1856, J. R. K.

This species is certainly not common in Ireland. In the stations at Tipperary and Waterford it grows luxuriantly, but confined to a few stations.

Dryopteris affinis (Fischer sp.). Fischer's Fern.

General, and generally diffused, and always distinct from the next. It grows most luxuriantly, and in a greater state of development at Beragh, county of Tyrone, than in any other locality in which I have met with it.

Dryopteris Borreri (Newm.). Borrer's Fern.

General, and generally diffused; affects more exposed stations and higher altitudes than the last.

These two species are among the more characteristic of the eastern species.

Athyrium filix femina (Linn. sp.). Lady Fern.

General, and generally diffused.

After a long and careful study of this, one of the loveliest of our native ferns, I cannot make out more than the one species of this fern in Ireland, of which forms at times occur which are identical, apparently, with *convexum*, *incisum*, and *molle* of the Floras. Whether the original types of these divisions were specifically distinct or not, I do not pretend to judge, but in Ireland we have but one species. I should except a small form (?) of this species, which I obtained some years ago at Ardmore, county of Waterford, growing on the sea cliffs, but which I have not had sufficient means of examining, to enable me to judge of its claims to specific distinction.

Asplenium lanceolatum (Hudson).

Cork: Kinsale, Mrs. J. Beete Jukes, 1856, *q. v.*

The only Irish specimen I have ever seen was that noted above. I have recently seen the plant growing luxuriantly in Cornwall, near Polperro.

Asplenium adiantum-nigrum (Linn.). Maiden-hair Spleenwort.

General.

A commonly diffused, though local plant, occurs on rocks and earth-banks as its natural habitat; I have met it everywhere. In the north and east it is generally more local than in the south.

Asplenium acutum (Bory MSS.). Killarney Spleenwort.

Kerry: Torc Mountain and other places near Killarney, not uncommon, J. R. K., 1856.

No one who has seen this plant growing wild, or authentic specimens under cultivation, would for one moment entertain the idea of this and *Asplenium adiantum-nigrum* being the same species; their habits are distinct, and constantly distinct, so much so that I have known persons who were not botanists readily point out the difference between the two species. The confusion relative to the two has, I conceive, arisen from the fact of a form of *A. adiantum-nigrum* existing abundantly in various parts of the country; amongst others at Mucruss, Killarney, which is extremely difficult to distinguish from the *printed description* of this plant, but scarcely to be confounded with the plant itself. I have no doubt the specimens examined by Professor G. J. Allman, and among which he found intermediate forms, fall under this category. The true

plant was found by me abundantly, 1856, growing in clefts in the rock, and in dry stations generally; the plants generally single.

Asplenium marinum (Linn.). Sea-side Spleenwort.

General along sea-coast. Valentia Island, inland, at an elevation of 500 feet above sea, J. R. K., 1856.

As common in the east as the west, in favourable localities. I never went anywhere that I did not find it on the cliffs.

Asplenium trichomanes (Linn.). Maiden-hair Spleenwort.

General.

A local species, generally diffused; it is naturally a denizen of the clefts of bare rocks.

Amesium ruta muraria (Linn. sp.). Wall Rue.

General.

Universally distributed, though, from the peculiarity of its growth, local; it attains its highest development on rocks, and also on shady walls, in some cases covering these to the total exclusion of every other kind of vegetation.

Scolopendrium vulgare (Linn. sp.). Hart's Tongue.

General.

This species occurs all over the island, but most irregularly; in some stations in immense profusion; in others, seemingly as favourable to its growth, one or two stunted plants alone will occur. It is a characteristic eastern species, as in the county of Dublin.

Grammitis ceterach (Linn. sp.). Scaly Hart's Tongue.

Tyrone: near Cappagh. Galway: Gort, Burren. Clare: Tullagh. Kilkenny: road to Carrick. Tipperary: Lorrha, rare; Nenagh, common. Limerick. Kerry: near Valentia, rare. Waterford: Ardmore, on clay-slate, local. Dublin: Belgard to Saggart, abundant; Whitechurch, rare, (very local). Wicklow: Glendalough, Enniskerry. Queen's County, J. R. K.

A local fern, much more abundant in the west than in the east; it is very characteristic of the former districts.

Trichomanes radicans (Swartz). Killarney Fern.

"Limerick: Cumailte Mountains, on authority of specimens in Glasnevin Gardens." Kerry: Valentia Island (this locality first noted by Miss H. Blackburne), apparently introduced; Killarney, Torc mountain, very abundant, 1856, J. R. K. Waterford: "Glounin Caragh," W. Andrews, Esq., *g. v.*; Valley of Blackwater, 1852, J. R. K., very abundant. "Cork:" *vide* "Newman's British Ferns." "Wicklow:" 1805, auctore, "Mackay's Flora Hibernica."

I have been particular in noting the localities of this fern, as its

history and distribution are matters of great interest. A careful examination of the three localities noted above, viz., Waterford, Killarney, and Valentia, have convinced me that the form called "*Andrewsii*" after its discoverer, to whom also is due the identification of this plant with *radicans* of Swartz, is the normal form of the plant; the form which occurs at Killarney, and by which the plant is best known, having been drawn up by moisture, by which the parenchymatous portions of the plants are developed at the expense of the fructification. The plants at Waterford fruit freely, and are scarcely distinguishable from *Andrewsii*, but under cultivation many of them pass into the ordinary Killarney form.

Hymenophyllum Tunbridgense. Tunbridge Filmy Fern.

Clare: Monounta, Feakle, abundant on bare cliff, 500 feet high, J. R. K. Tipperary: Morgan's Glen, E. H. Sargent, Esq., mixed with next, *q. v.* Kerry: Valentia Island, rocks over Glenleavy woods, cliffs near slate quarries, sparingly; Killarney, abundant. Waterford: Glandine, sparingly; Portlaw; Curraghmore wood, abundant and fine, J. R. K.

This species has been confounded with the next; thus the stations given by authors at Glencree and the Waterfall, county of Wicklow, refer to next. I have never seen authentic specimens of this species except from the south and west.

Hymenophyllum unilaterale (Wild). Wilson's Filmy Fern.

Tyrone: Gortin Gap, abundant among rocks, 1857, J. R. K. "Tipperary: Morgan's Glen, E. H. Sargent, Esq.," *q. v.* Kerry: Valentia Island, near slate quarries, common. Killarney: very common, J. R. K. "Dublin: Kelly's Glen, W. Andrews, Esq.," Wicklow: Waterfall, very abundant. Glencree: Greater Sugarloaf, scarce, J. R. K.

This species is most commonly diffused in the east and north, but grows more luxuriantly at Killarney than anywhere else that I have seen it.

The following Irish species have been recorded, and authentic specimens of them have been shown to me, but I have never been fortunate enough to meet them myself:—

Adiantum capillus-Veneris (Linn.). Maidenhair.

"Leitrim: Glencar," Right Hon. J. Wynne, *vide* "Natural History Review," page 69, vol. iv. Kerry: "Tralee, W. Andrews, Esq.," *q. v.* "Galway: Urrisbeg," W. M'Calla. "Clare: Ballyvaughan."

Polystichum lonchitis (Linn.). Holly Fern.

"Sligo: Benbulbin," *q. v.* "Kerry: Brandon."

Homostheum Thelypteris (Linn. sp.).

"Kerry: Killarney, Mucruss Demesne." Professor R. W. Smith, M. D., showed me an extensive living series of this plant from this, Mackay's original station, in 1856. "Mayo and Antrim."

Asplenium viride (Hudson sp.).

"Kerry: Toro Mountain, Killarney," 1856, *g. v.*

The following have been also recorded, but specimens gathered in Ireland have not come under my notice, with one exception:—

Cryptogramma crispa (Linn. sp.). Recorded from Down, Antrim, and Louth.

Gymnocarpium Dryopteris (Linn. sp.). Recorded from Antrim, Mr. D. Moore.

Lophodium rigidum (Hoff). Recorded from Louth by the Rev. Mr. Darby (*g. v.*): query, introduced plants?

The following species, natives of Great Britain, have not yet been recorded in Ireland, and, with the exception of the species queried (?), are not likely ever to be:—

Gymnocarpium Robertianum, *Woodsia Ilvensis*, *Woodsia Alpina*, *Cystopteris Dickieana*, *Cystopteris myrrhidifolium* (?), *Lophodium callipteris* (admitted into Dr. Mackay's list, as he himself has informed me, by an error), *Dryopteris abbreviata* (?) (I believe I met this at Omagh, but cannot yet speak positively), *Pseudathyrium Alpestre*, *Pseudathyrium flexile*, *Amesium Germanicum* (?), *Am. septentrionale*; and *Lophodium uliginosum* (pointed out to me living in the woods near Chisselhurst, Kent, by G. B. Wollaston, Esq.).

I have carefully abstained from admitting into this list any form of whose specific existence I am not convinced, such as *Asplenium anceps* (Lowe), first recorded from Killarney (where I have myself found it), by W. Andrews, Esq., and by him shown to be only a state of *A. trichomanes*; *Lophodium nanum*, extremely common on our mountains, but apparently only a state of *Lophodium multiflorum*, &c.

The nature of the soil or rock on which the plants grow is but of little moment; careful notes of the distribution and growth of the ferns in distinct geological districts would lead to the conclusion that the only influence thus exercised relates more to the amount of shelter, moisture, and depth of soil mechanically dependent on geological formation than to the chemical constituents of the rocks. Numerically speaking, the species of ferns found on the bare granite ranges of the county of Dublin are equal to those of the more favoured and sheltered limestone districts of the Burren, and this becomes more striking when we except those plants of Lusitanian origin which occur in the latter county. Yet in the Fern Flora of the several districts there are features sufficiently marked to be of importance in the investigation of the sources whence the plants came, certain species of ferns in the several districts being more abundant, and growing in greater luxuriance, than the remaining species in that district, or than they themselves are found in other districts.

Thus, excluding such generally diffused species as *Pteris aquilina* and *Asplenium marinum*, the characteristic ferns are as follows, in the several districts:—

Dublin: for the *Lowlands*—*Polystichum angulare*, *Scolopendrium vulgare*, *Dryopteris affinis*, *Asplenium trichomanes*. For the *Highlands and Bogs*—*Lophodium multiflorum*, *Athyrium filix fœmina*, *Dryopteris Borreri*, *Dryopteris affinis*, *Lomaria spicant*, *Asplenium adiantum-nigrum*.

Kildare: *Lowlands*—*Polystichum aculeatum*, *Polystichum angulare*, *Scolopendrium vulgare*, *Lophodium multiflorum*, *Dryopteris affinis*, *Athyrium filix fœmina*.

Tyrone: *Highlands*—*Athyrium filix fœmina*, *Lophodium Fœnesecii*, *Lophodium multiflorum*, *Hymenophyllum unilaterale*. *Lowlands*—*Polystichum aculeatum*, *Dryopteris Borreri*, *Dryopteris affinis*.

Clare and Galway: *Lowlands*—*Polystichum aculeatum*, *Polystichum angulare*, *Polypodium vulgare*, *Athyrium filix fœmina*, *Amesium ruta muraria*, *Grammitis ceterach*, *Lophodium Fœnesecii*, *Asplenium adiantum-nigrum*. *Highlands and Bogs*—*Lomaria spicant*, *Lastrea montana*, *Loph. multiflora*, *Asplenium trichomanes*, *Cystopteris fragilis*, *Osmunda regalis*, *Hymenophyllum Tunbridgense*, *Polypodium vulgare*.

Kerry: *Lowlands*—*Polypodium vulgare*, *Polystichum angulare*, *Loph. Fœnesecii*, *Dryopteris affinis*, *Dryopteris Borreri*. *Highlands and Bogs*—*Osmunda regalis*, *Hymenophyllum Tunbridgense*, *Hym. unilaterale*, *Trichomanes radicans*, *Hemestheum phegopteris*, *Polystichum angulare*, *Asplenium acutum*.

Waterford and Cork: *Lowlands*—*Scolopendrium vulgare*, *Polystichum angulare*, *Grammitis ceterach*, *Asplenium adiantum nigrum*, *Polypodium vulgare*, *Lophodium multiflorum*. *Highlands and Bogs*—*Lophodium Fœnesecii*, *Dryopteris affinis*, *Hymenophyllum Tunbridgense*, *Osmunda regalis*.

Besides these, in the following districts ferns of local distribution occur, but not abundantly enough to impress a general character on the Flora:—

In Kerry: *Asplenium acutum* and *viride*, and *Adiantum capillus-Veneris*. Cork: *Asplenium lanceolatum*, *Trichomanes radicans*. Waterford: *Trichomanes radicans*, *Lophodium spinosum*. Tipperary: *Lophodium spinosum*. Wicklow: *Trichomanes radicans*, *Hemestheum phegopteris*.

Of the Irish species, all, except *Asplenium acutum*, have occurred in England, but many grow more abundantly and luxuriantly in Ireland; while, as has been already shown, many of the British species are unknown in Ireland. These latter, we are justified in surmising, are either Germanic or Boreal types, as many of them on the coasts of Wales and Scotland are found flourishing in stations identical with some on this side of the channel, the narrow strait which severs the two islands alone dividing them, and the missing species so hardy in their habits, as, once introduced into this country, to have been able to stand the ordeal of our mildest winters and severest springs.

I would be inclined to look on such ferns as *Cryptogramma crispa*, *Asplenium viride*, and *Cystopteris fragilis*, as northern species, owing to their occurring rarely, or comparatively so, in this country as compared with England and Scotland; the first having probably been introduced into this island from England shortly previous to the severance of the countries, and having since then, owing to the change of climate, barely

languished out an existence,—this supposition being strengthened by the fact, that the Irish localities recorded for it are adjacent to, or at least in the same districts as those in which *Polystichum Lonchitis*, an undoubted boreal species, is found (the late Professor Smith, in his description of the Flora of the Alps, *vide* "Natural History Review," page 48, vol. iv., mentions his having remarked these ferns growing abundantly in juxtaposition at a considerable elevation).

Of the place of origin of *Trichomanes radicans* and *Asplenium acutum* there can be little doubt, Lusitanian is stamped on every fact connected with their distribution.

This view of the origin of *Trichomanes radicans* enables us to reconcile the seeming contradiction of its present and past distribution in the British Isles; for, looking at *L. Fæneseccii* as a member of the same Flora, that this is so is evident, since the district in which it is at present most characteristic and abundant also furnishes such confessedly Lusitanian types as *Erica ciliaris*, *E. Sibaldii*, *E. Mediterranea*, *Asplenium acutum*, *A. lanceolatum*, *Simethis bicolor*, *Pinguicula grandiflora*, &c., among plants; and among animals, *Bufo calamita*, *Helix pisana*, *Anthrocerus minos* (?), *Geomalacus maculosus*, *Echinus lividus*, *Cossonus Tardii*, *Thia polita*, &c.,—forms sufficiently characteristic to mark the district as possessing a great Lusitanian colony, many of the species not occurring elsewhere in Ireland and in England, only in the southern counties.

Giving due weight to the difference of habit of growth,—*Trichomanes* requiring three to four years for the full development of its fructification, and *Loph. Fæneseccii* perfecting its spores in the course of a season; bearing in mind the different physical conditions under which these two species are *capable* of existing,—an examination of their present distribution furnishes at once the clue as to how *Trichomanes* could have ever occurred at Bellbank (Yorkshire), and Powerscourt (Wicklow). The following general laws of distribution explain the whole difficulty:—

- I. A species having spread from its centre, that disturbing causes incompatible with its existence may arise at any point in the track of that distribution; the range of its existence may cease at this point, and the continuity of the distribution be destroyed, giving rise to a colony or colonies.
- II. That this interruption of continuity may proceed even to the total destruction of the *capital centre*, the *colony* or colonies remaining in vigour, or at least existing subsequent to the destruction of the capital.
- III. That the disturbing causes having been removed, and the range of existence being thus restored, the species may spread from this colonial centre or centres as from the capital, or even re-colonize the capital.

Let us examine in this point of view the recorded range of *Trich. radicans* and *Loph. Fæneseccii*. *Trichomanes* flourishes in a district extending from about 51° 30' N. to 52° 40' N. (Bantry being the most southern

recorded station, and Cumailte Mountains, county of Limerick, its most northern), and as far east as about $7^{\circ} 50' W.$, the Blackwater valley representing the latter; the plant growing in greatest perfection, that is, fruiting most regularly and perfectly at Iveragh, and in the valley of the Blackwater; the extreme humidity of the Killarney district, whilst encouraging the ordinary growth of the plant, interfering with its fruiting.

Outside this well-marked district are two outlying stations, both, at the time of their discovery, sickly, and now extinct, or at least one of them: one, Wicklow, situated in about $52^{\circ} 10' N.$ and $6^{\circ} 20' W.$; the other, Bellbank, near Bingley, Yorkshire, about $53^{\circ} 30' N.$ and $1^{\circ} 55' W.$

In all these districts *Lophod. Fenesecii* is found luxuriant, but local in the latter two.

Suppose these two plants to have made their entry into Ireland somewhere in that district which *Asplenium lanceolatum*, *A. acutum*, *Adiantum capillus Veneris* mark out as the head-quarters of the Lusitanian Flora, and to have spread under favourable circumstances as far north as Yorkshire; that then, the two countries severed, the physical conditions of district were so altered as to destroy the balance necessary to the former's existence in the intervening districts. This favoured spot at Bingley, where Richardson gathered, one hundred and fifty years ago, the celebrated specimen which has so puzzled botanists, remained as the last haunt of *Trichomanes radicans*; whilst its hardier compatriot escaped the general destruction of Lusitanian forms so well as to supply us with abundant stations even much further north than this. Similarly the Wicklow station may be but an offset from that in the county of Waterford, and may be even anterior to it, the chain of continuity being broken by some causes which caused the disappearance, plant by plant and station by station, of *Trichomanes*, so that the sickly plant discovered by Dr. Whitley Stokes and Miss Fitton, in 1805, at Powerscourt Waterfall, at last alone remained to point out the old colonization of the district with the species.

Some explanation of the set of terms already freely used is necessary, viz., "balance necessary to the plant's existence." By this is meant those degrees of intensity of physical agencies, especially light, heat, and moisture, compatible with the existence of any species, or, as we might otherwise express it, the *physical range of its existence*. The following series of laws express this more generally:—

1. Every species requires light, heat, moisture, &c., for the due performance of its functions, and the quantity of these thus necessary may vary within certain fixed limits.
2. That this limited standard may be still further either increased or diminished within certain further limits, without destruction of the life of the species, though usually at the expense of or deterioration of some of the functions.
3. That the (1) standard of growth and (2) range of existence varies in species springing from the same centre.

Suppose two plants, species A and B, having the following range of existence and standard of growth,—

	Range of Existence.		Standard of Growth.	
	A.	B.	A.	B.
Light, . . .	50°–10°	90°–20°	40°–20°	70°–30°
Heat, . . .	120–30	120–10	100–70	100–30
Moisture, . .	200–70	170–10	150–80	110–20

Now it is manifest these two species, though capable of existing in the same district, are not uniformly so, but that one can exist in a district where the other must perish.

For instance, in a country whose average climate was represented by the following range, L, 80°–10; H, 80°–25; and M, 90°–10; A would perish, except from a few favoured spots, and a slight further diminution of the standard would destroy it altogether; while B would suffer but slight inconvenience, but would be probably found least frequent in the very station most favourable to A. Substitute for A and B in the above, *Trichomanes radicans* and *Lophodium Fenesecii*, and the reason of the persistence of the latter in districts in which the former has become extinct is evident, particularly if we remember the peculiar conditions, as regards light and moisture, requisite for the well-being of *Trichomanes*, and the perfect carelessness of *Loph. Fenesecii* as regards these. It but needs the supposition of the destruction of the woods of a district by an elevation of the temperature, or any other cause; the light would at once mount up to a standard incompatible with the well-being of *Trichomanes*, which would then necessarily perish from every place, except a few limited localities, where sufficient shelter might be afforded it by rocky crannies, such as the Powerscourt station might afford, and here the species would languish out a feeble existence, while *Loph. Fenesecii*, heedless of the increased light, would still flourish on.

One of the animal types, already mentioned, affords such strong corroboration of this theory that I cannot resist quoting it. *Helix pisana*, a Mollusc of South Europe, was found by Mr. W. Andrews at Iveragh, Kerry. Next it occurs in a lengthened strip along the coast of Dublin, Meath, and Louth, even as far south as Rush. Next it occurs at Tenby, about half a degree to the south of its Kerry station; and lastly, it is recorded from Cornwall, that favoured spot, where still flourish many confessedly Lusitanian forms. Let any one take the trouble of examining on the map the connexion between these localities, and compare with them the distribution already laid down for *Trichomanes* and *Lophodium Fenesecii*, and he will perceive that the connexion between the two districts is too strongly marked to be merely accidental, but rather

such as bears me out in stating that the great Lusitanian life-tide once extended much further north than it at present does.

It would be easy, by means of these same laws, to demonstrate the causes of the local occurrence of many of the ferns in Ireland, but this paper has already extended to such a length that I must content myself with the following arrangement of centres to which the species appear to have belonged.

Lusitanian: *Asplenium acutum*, *Asplenium lanceolatum*, *Adiantum capillus-Veneris*, *Lophodium Fœnesecii*, *Lophodium* (?) *spinosum*, *Hymenophyllum Tunbridgensis*, *Grammitis ceterach*. Sub-Lusitanian: *Asplenium trichomanes*, *Asplenium adiantum nigrum*, *Amesium ruta muraria*.

Germanic: *Ophioglossum vulgatum*, *Botrychium lunaria*, *Blechnum spicant*, *Pteris aquilina*, *Polypodium vulgare*, *Polystichum angulare*, *Lophodium* (?) *multiflorum*, *Athyrium filix fœmina*, *Asplenium marinum*, *Scolopendrium vulgare*.

Northern: *Gymnocarpium Phegopteris*, *Cystopteris fragilis*, *Polystichum Lonchitis*, *Cryptogramma crispa*, *Polystichum* (?) *aculeatum*, *Lastrea montana*, *Hemeteum* (?) *thelypteris*, *Gymnocarpium Dryopteris*, *Asplenium viride*, *Dryopteris affinis*, *Dryopteris Borreri*.

The above distribution will, perhaps, surprise many, especially the reference to the Germanic type (i. e. Germano-Indian continental type) of all our most generally diffused types; but finding these ferns equally distributed in Great Britain and Ireland, I am inclined to think they must have spread over the two countries at the time when the Germanic Fauna were introduced through England into this country: by sub-Lusitanian I mean types which, undoubtedly coming from the same centre, were introduced into this country before the restricted Lusitanian species made their appearance.

Professor Kinahan exhibited some very fine varieties of *Polypodium vulgare*, *Asplenium trichomanes*, and *Dryopteris affinis*, sent to him by H. A. Mandeville, Esq., of Anner House, Clonmel, by whom they had been obtained near Carrick-on-Suir. The first-named exhibited a great number of secondary axes sprung from the main axis, and was a fine example of the irregularity of outline sometimes assumed by Acrogens. Dr. Kinahan had never seen such fine specimens. The other two, though extremely interesting, were more common, and had occurred frequently to Dr. Kinahan.

Mr. J. Bain exhibited a fine example of a curious variety of *Athyrium filix fœmina*, from the county of Wicklow. It was characterized by the stunted growth of the pinnæ, and total abortion of the stalks of the pinnules, which gave it an appearance resembling somewhat that of *A. trichomanes*.

Dr. W. Frazer exhibited a curious pendant cup-shaped nest of *Vespa* — ? attached to a twig. It was taken at the Dargle, county of Wicklow; but unfortunately the maker was not captured, which rendered it impossible to identify the species.

The following were declared duly elected :—

Ordinary Members :—R. J. Daniell, M. B., Baggot-street; John Lawler, Esq., Longford-terrace.

Corresponding Member :—Rev. H. H. Jones, Adare, county of Limerick.

Associate Member :—W. H. Bailey, Esq., Geological Survey of Ireland.

The Meeting then adjourned.

FRIDAY EVENING, APRIL 9, 1858.

CHARLES P. CROKER, M.D., M.R.I.A., VICE-PRESIDENT, in the Chair.

THE Minutes of the previous Meeting having been read and confirmed—

Mr. R. P. Williams exhibited a black-and-white variety of the field mouse (*Mus sylvaticus*), which had been presented to the Society by C. J. Walmeslie, Esq., whose attention was first called to the specimen in question by the fact of its being possessed of the power of producing a chirping noise. Instances of these so-called "singing mice" had already been noticed on several occasions, the so-called song being, probably, dependent on disease in the animal. Varieties of this species as to colour were rare in the wild state.

The Rev. Professor Haughton communicated the occurrence of *Lepidomelane* in the county of Carlow; specimens having been forwarded to him from Ballyellen, by Charles P. Cotton, Esq.

MR. WILLIAM ANDREWS, Honorary Secretary, read the following—

NOTES ON THE FISHES OF THE WESTERN COASTS, AND RECORD OF THE OCCURRENCE OF THE BOAR-FISH (*CAPROS APER*) IN THE IRISH SEAS.

As other objects of interest new to the marine zoology of Ireland are to be brought forward this evening, I shall be as concise as possible in selecting from the many notes which I have made regarding the deep-water animals of the west coast, especially the fishes.

The existence on the west coast of Ireland of botanical and zoological types similar to those of the shores of Cornwall and Devon, and of Spain, Portugal, and the Mediterranean, has often afforded subject-matter for the meetings of this Society. It has been supposed that currents setting from the southward, and here mingling, have raised the temperature of the water, and carried to these shores the denizens of those around the Tagus and Mediterranean. It is known to nautical men that a stream more or less perceptible, and termed Rennel's Current, has had the effect of carrying ships out of their course to the northward, when seeking to make the Cape from the Western Ocean; but it has

never been satisfactorily proved that the temperature of this coast is due to any current, nor are we justified in attributing to it the occurrence of the interesting plants and animals which have from time to time occurred here.

A comparison of the geographical position of these coasts with the shores of Cornwall leads us to expect similar species of plants and animals, while the mild and moist atmosphere caused by the prevalence of the westerly winds maintains a temperature which permits the growth throughout our western hills of plants peculiar to the sub-alpine districts of Spain and Portugal. The beautiful sea-pea (*L. maritimum*) is of far more luxuriant habits and robust growth at its only Irish habitat, Rosbegh, at the south-eastern extremity of Dingle Bay, than in the pebbly beaches of Lincolnshire and Suffolk, and in Shetland; and, according to the late Dr. Graham, of Edinburgh, is identical with the plant of the south of Europe. Many of the Lichens and Algæ of these shores are identical with those of the south-west of England and of the Mediterranean.

With regard to the fishes, many species found in Cornwall and the Mediterranean have been also met with on our south-western coasts, the announcers of their occurrence in too many cases recording them as "visitors." In all branches of the fisheries which I have been able to investigate, I have ever found facts condemnatory of the erroneous idea of the migration of fishes; and wherever the captures already alluded to have been made, there was the established region of the fishes' existence. In the distribution of marine animals locality may often affect a species as regards its abundance, greater development in size, or perfection in type; but wherever we have met with individual instances of the occurrence of rare species, we may rest assured that the locality is, to a certain extent, either greater or less favourable to their existence. Our observations must be, indeed, limited, such slender opportunities are and have been afforded to us of examining and exploring the haunts of the deep-water marine fishes; and we can venture to put forward but imperfect views at present with regard to the investigation into the nature, habits, and extent of existence of such animals.

In the collections made from time to time in trawling and other investigations of the coasts, I have often proved how essentially important it is to note accurately the localities and habits of the various fish and other marine animals,—peculiar soundings affecting the habits, character, and quality of many species of fish. In colour and character of species many of the Triglæ, or Gurnard family, obtained in Dingle and Ballinskellig Bays, are identical with, or approach more nearly to the same species from the Mediterranean than to specimens from the northern seas. It is many years since I called attention to the occurrence here of the supposed species *Trigla Blochii*, and of a species in character identical with *Trigla pini* (Bloch).

Although we have some representatives on this coast of fish of the northern regions, such as *Cottus Grœnlandicus*, *Sebastes Norvegicus*, *Morrhua minuta*, and *Raniceps trifurcatus*, all supposed at present to be of

great rarity; yet the principal species are those occurring also on the south-west coast of England and in the Mediterranean. Among these may be mentioned—

Lemon Sole, *Solea pegasus* (Yarrell).
 Variegated Sole, *Monochirus variegatus*.
 Solenette, *M. linguatulus*.
 Rock Sole (unrecorded species).
 Scaldfish, *Rhombus arnoglossus*.
 Mackerel Midge, *Motella glauca*.
 Two-spotted Goby, *Gobius bipunctatus*.
 Little ditto, *G. minutus*.
 Speckled ditto, *G. reticulatus*.
 Red Mullet, *Mullus surmuletus*.

All taken, in deep water, in Dingle Bay, and off Ventry Harbour.

Black Bream, *Cantharus griseus*.
 Spanish Mackerel, *Scomber colias*. A specimen of this, weighing 3lbs., having been taken in a herring-net, was sent to me.
 Stone basse, *Polyprion cernium*.
 Comber Wrasse, *Labrus comber*.
 Red ditto, *L. trimaculatus*.
 Small-eyed ditto, *Crenilabrus microstoma*.
 Rainbow Wrasse, *Julis Mediterranea*.

I have the pleasure to-night of bringing forward another addition to the Ichthyology of Ireland,—a fish peculiarly Mediterranean,—the boar-fish, *Capros aper* of Lacep. and Risso, *Zeus aper* of Linnæus, *Perca pusilla* (Brunnich). This little fish, so remarkable for its beauty and rarity, was taken in a trawl off Ventry Harbour, in soundings of fine soft sand, and was secured for me through the vigilance of one of the most experienced and intelligent of the Dingle fishermen, Mr. Eugene Moriarty.

Whenever anything remarkable has been obtained, and in the ground of the most valuable marketable fish, the soundings, &c., are duly recorded. Thus, off Ventry the bearings are:—Old Man, opening in the Sound of the Blaskets, bearing N. W.; the Eastern White House at Ventry, a sail's-breadth open of the west point, bearing N. E. by N.; the eastern point of the Bay open of Minard Point, bearing E. by S. 27 fathoms, fine sand. Standing in:—Ventry houses, opening of the west point; Minard, touching Bull Head; Mount Eagle, on the western point of Ventry, bearing N. N. W. 20 fathoms, fine soft sand; closer in, Crow Rock, in with the tower of Bing-Bong Head, bearing E. half N.; Minard Point shut in.

These were the grounds of many of the fish that I have submitted to your notice, and the locality of the capture of the present.

On reference to the several books of British ichthyology, there appear only to be two records of the capture of the *Capros aper* on the coasts of England,—one taken in Mount's Bay, coast of Cornwall, in October, 1825; the other obtained in the Bridgewater fish-market, in April,

1833,—and this is the first record of its capture on the Irish coasts. In its recent state it presents a beautiful appearance. The peculiarity of its projecting snout, its oval and compressed body, shaded on the back with a rich brownish carmine, of a brighter and more reddish colour on the sides, and silvery towards the abdomen; the body hispid, covered with minute and rough scales, beautifully ciliated on the margin; the mouth with very minute teeth, and very protractile, similar to the Doree; eyes very large, pupil a dark plum colour, the irides a rich pink; the first dorsal very strong and spinous, as also the ventrals; the membranous and emarginate rays of the dorsal of a yellowish tinge; pre-operculum finely serrated. About six and a quarter inches in length from the snout to the extremity of the caudal fin, and the body in depth three inches; the dorsal-fin rays are continuous, the first having very strong spines.

It is allied to the Zeinæ, or Dories, and is evidently a ground-feeding fish, and a deep-water species. Like the Doree, its mouth is protractile, and capable of much expansion, favouring the capture of soft and minute animals that may float in its way; for, like the Equulea, a noted little fish of the Indian Ocean, it can suddenly form a tube-like projection of its mouth. Its eyes, which are brilliant, are very large for the size of the fish, and are such as seem peculiar to fishes feeding at considerable depths, and which are seen in the genera *Platysomus* and *Blepharis*, of the same sub-family.

PROFESSOR J. REAY GREENE then brought forward the following—

ADDITIONS TO THE IRISH FAUNA.

THE first of these was an apparently new species of Brittle-Star, allied to the *Ophiocoma neglecta* of Forbes, from which species it differed in the shape and convexity of its disk, which presented, moreover, a cleft and emarginate appearance opposite the insertion of each of the rays; in the pair of heart-shaped plates, situated within the margin of the disk, by which the rays were subtended; in the shape of the upper ray plates, which were of a somewhat transversely ovate form; in the number of spines (three or four on each side), with which the lateral ray plates were provided; and lastly, in the relative proportion (1 : 4) between diameter of the disk and the length of the rays. For this Brittle-Star he would suggest the name of *Amphipura Leachii*.

The second addition which he wished to record was a species of sea-anemone, the *Bunodes gemmacea* of Gosse, hitherto unknown on the Irish coast, though extremely abundant on the shores of Devonshire and other parts of England. On the outside of Cork Harbour it seemed to be equally common.

Another species of *Bunodes*, which he supposed to be new, had likewise occurred to him, as also a peculiar form of *Lucernaria* (*vide* "Proceedings of the Dublin University Zoological and Botanical Association," March 19, 1858).

He had also met with that very remarkable and beautiful stalked Polyzoan, the *Pedicellina Belgica* of Van Beneden. Of this he had examined two living specimens, both growing upon fronds of *Laminaria*. On the same fronds were several cells of *Gemellaria loriculata*, a common English Polyzoan, of which, strangely enough, no Irish habitat has yet been recorded. The figure of Johnston, drawn probably from a dead specimen, represents the cells as too much flattened.

All the above were taken between tide-marks on the sea-shore near Trillick, county of Cork, opposite the residence of Lord Fermoy. Here, too, he had also captured a single young specimen of the comparatively rare *Uraster hispidus*.

Dr. E. Percival Wright called the attention of the Meeting to the Polyzoa noticed. It showed the necessity which existed for thoroughly examining this group in Ireland.

Professor Kinahan, M. D., exhibited a fine specimen of *Polyporus gigantea*, measuring nearly two feet in thickness; the layers of which it was composed covered an extent of surface of nearly two feet by nine inches. It was attached to a stem of whitethorn (*Crataegus oxyacantha*), and had been found in the breast of a ditch near Portlaw, county of Waterford. He was indebted for the specimen to Miss H. Shaw, of Springfield, Portlaw. The specimen illustrated the irregular mode of the plant's growth, and its perennial nature, in a remarkable manner. Dr. Kinahan alluded to the great abundance and luxuriance of fungi, mosses, and lichens, in and about Curraghmore, county of Waterford, where he had also found *Lophodium spinosum* growing in some abundance.

The Meeting adjourned to the month of May.

FRIDAY EVENING, MAY 7, 1858.

PROFESSOR W. H. HARVEY, M.D., M.R.I.A., F.L.S., PRESIDENT,
in the Chair.

THE Minutes of the previous Meeting were read and confirmed.

Dr. Kinahan read the following recommendation of the Council:—

“That Robert John Montgomery, Esq., be appointed as Honorary Director of the Museum, the Director to be *ex-officio* on the Council.”

Moved by Dr. Kinahan, seconded by J. I. Whitty, LL.D., and unanimously resolved,—That this recommendation of the Council be adopted by the Society.

REV. EUGENE O'MEARA read the following paper—

ON THE OCCURRENCE OF ANTHOZOIDS IN *PLEUROSIGMA SPENCERII*.

ON Friday evening, April 30, I was engaged in the examination of a gathering I had made two days previous from a running stream.

On looking into the microscope I was much struck with the peculiar appearance of one of the forms that first presented itself in the field,—a *Pleurosigma Spencerii*. The usual colour of the endochrome in this species is pale brown, but in the present instance it was a beautiful green. A number of granules of a bluish-green colour were distributed through the cell. In a few minutes I observed that the greater portion of the granules, at least two-thirds, moved with a sudden jerk to the lower part of the cell. Some of the granules passed out of the valve, and immediately after an Anthozoid issued from the cell. Shortly after another made its appearance, and another, until six or eight had been extruded.

All these organisms proceeded in the same manner from the valve, and exhibited themselves in the same spot, within what appeared, under a quarter-inch objective, with No. 2 eye-piece, about $\frac{1}{16}$ th of an inch from the extremity of the valve. In form the Anthozoids, if at rest, would have presented very much the appearance of a spike of thistle-down. The head was of a pale green colour, and round it the tail was lashed from side to side with great activity.

On the same occasion several forms were observed, presenting similar appearances, with Anthozoids moving rapidly about in their immediate neighbourhood. Among these were two or three of the species named *Cymatopleura solea*; but in no case except the one just alluded to did I observe them issuing from the valve.

On the evening following that in which the preceding observation was made, I examined a drop from the same gathering, when a great change was noticed to have taken place in the appearance of such diatomaceous forms as occurred, compared with that which they presented the evening before. But few granules were seen. The endochrome also had changed its colour from green to olive, and, instead of being diffused through the cell, was in many instances collected in a narrow band along each side of the cell, or at the opposite ends of it. In some cases these bands had broken up into isolated portions, and in others the valve was as free from endochrome as if it had been treated with acid.

The President dwelt on the value of the observation, which was, he believed, perfectly new, and he had no doubt, as such, would be controverted, or at least probably received with doubt. There was, therefore, the more necessity for repeating the observation, and, if possible, confirming it. He thought it most probable that these bodies were Zoospores, and not Anthozoids; though this would not in the least detract from the value of the observation. Perhaps Mr. William Archer, who had devoted so much time to the study of the Desmidiæ and other simple vegetable forms, would favour them with his views on the subject.

Mr. Archer said that he felt inclined to look on these bodies as Zoospores, as suggested by Professor Harvey, otherwise we must suppose that two forms of the same mode of reproduction (that by dissimilar cells) existed among these plants. The observation was, nevertheless, a most valuable one.

PROFESSOR KINAHAN, M. D., read a paper—

ON THE GENERA PHILOSCIA (LATREILLE); ITEA (KOCH); PHILOUGRIA (KINAHAN); COMPRISING DESCRIPTIONS OF NEW BRITISH SPECIES.

(WITH A PLATE.)

IN an "Analysis of the British Oniscoidea" read before Section D of the British Association, at their recent Meeting in this city, and afterwards published in your Transactions, reasons were given for re-establishing the genus *Philoscia* (Latreille), which M. Edwards, Dana, and others, are inclined to incorporate with the genus *Oniscus*. As first described, the genus included but one species, the *Oniscus muscorum* (Scopoli), *Oniscus sylvestris* (Fabricius). To-night I have to announce another species of the genus, which confirms me in the propriety of the establishment of this genus, as it agrees with *Phil. muscorum* in all those characters which led to the generic separation of that species from *Oniscus*.

The genus *Philoscia*, though established by Latreille, appears to have been unknown to all the German authors who have written on the group, with the exception of Zaddach, who gives a very fair description of it. H. Schæffer states:—"Philoscia: Up to this, but one figured species is known, namely, *O. muscorum* (Scopoli). Whether the species *O. sylvestris* here referred to is properly cited here may be questioned; to me the genus and species is unknown." Milne Edwards contents himself with copying Leach's description of the species; while Lereboullet evidently has never seen the typical species, as he describes a well-marked species of *Oniscus* for it. This is singular, as the animal is one of the commonest of the group in Ireland and England, and, Zaddach states, also common in some parts of Germany.

The genus *Philoscia* and its relations were so fully discussed in my former paper, that it is unnecessary here to do more than briefly describe the species and genus.

Family.—PHILOSCIDÆ.

Genus 1.—PHILOSCIA (Latreille).

Telson (cingulum ultimum) coxis perparvulis. Pleopoda (pedes spurii) posteriora nuda, ad telson marginem anteriorem articulata, basis quadrilateralis; *Ischium* trigonum, satis appendiculatum, nudum, lobus accessorius triangularis. Antennæ internæ 3-articulatæ. Antenn. extern. basis rotundatus, non lobatus; filamentum 3-articulatum. Abdominis cingulum coxæ parvæ. Carapacis frons nec medianè nec lateralitè lobatus.

1.—*Philoscia muscorum* (Latreille).

Corpore læve, nitido, splendido. Fronte paululum medio arcuato. Telson late-triangulari, apice acuminato, lateribus rectis. Pleopodis posterioribus; *Ischio*, falciformi; Appendice ischii dimidio longitudinem vix superante.

Sub musco lapidibusque ubique abundantissime, etiam ad littus marinum.

2.—*Philoscia Couchii*, n. s.

Corpore læve, splendido. Fronte recto. Telson lineare-triangulari; apice obtuse-truncato, setis validis armato; lateribus paululum excavatis. Pleopodis posterioribus; Ischio falciformi-subulato. Appendice vix $\frac{1}{2}$ ischii longitudinem æquante.

Sub lapidibus algisque marcescentibus ad maris marginem ad "Talland Cove," juxta Polperro, Cornwall, Angliam hæc species a me reperta fuit. Viro clarissimo Jonathan Couch, F. L. S., qui de animalibus marinis regionis Cornubiensis cognoscendis optime meruit, dicatam esse velim.

PHILOSCIA.

Body flattened; no lateral or median lobes to carapace; internal antennæ three-jointed. Peduncle of external antennæ rounded, unlobed. Tige three-jointed. Posterior pleopods (last pair of false feet) attached to exterior margin of telson, uncovered. Peduncle (basis) quadrilateral. Ischium trigonal, and, as well as accessory appendage, uncovered.

Species 1.—*Philoscia muscorum* (Latreille).

Bodysmooth and shining; head transversely elliptical, arched in front; no true lateral or median lobes; internal antennæ inconspicuous; external antennæ densely hairy; abdomen much narrower than cephalothorax; telson (last ring) broadly triangular; apex acute; posterior pleopods (abdominal false feet); Ischium trigonal, spinous along edges. Accessory appendages more than half length of ischium, and nearly attaining to its summit.

Colour: fulvous, with dark black patches and white blotches. A pale salmon-coloured variety is not uncommon. Habitat: dry places, under leaves, stones, moss; also near sea-shore very common.

Habits: runs rapidly; seeks sunshine; does not roll into a ball; feigns death.

Localities: Dublin, Wicklow, Meath, Wexford, Cork, Waterford, Tyrone, and probably all over Ireland. England—Middlesex, Essex, Kent, Plymouth, Devonshire not so common, Cornwall, Polperro, &c.

Species 2.—*Philoscia Couchii* (Mihi) n. s. Plate XXIII., Fig. 4.

Body smooth, elliptical; head somewhat rounded, nearly straight across front; beneath orbits a small lobe, arising from superior margin of antennal ring. Internal antennæ inconspicuous; external antennæ hairy; tige long and narrow. Abdomen narrower than cephalothorax. Telson (last ring) narrow, linearly triangular; apex rounded, and fringed with stiff bristles; sides excavate. Posterior pleopods (last pair abdominal feet); ischium elongate, falciform, subulate. Accessory appendage scarcely one-fourth the length of ischium; in other respects as *Philoscia muscorum*.

Colour: lead gray, uniform to the naked eye.

Habitat: under stones, and amid decaying sea-weed at high-water mark; local.

Habits: runs with great agility; does not roll.

Locality: Talland Cove, Cornwall, 1858.

I have named it after Jonathan Couch, M. D., F. L. S., the well-known illustrator of Cornish zoology.

The only species I can at all find described which comes near my *Philoscia Couchii* are two figured in Dana's great work as Onisci: one, *O. nigrescens*, from New Zealand; the other, *O. pubescens*, from South America. Dana evidently was unacquainted with the genus (as I have before shown) as distinct from Oniscus.

In the new species the frontal border of carapace is carried well forward, and passes down to the antennæ, the superior antennal ring having its margin produced into a minute lobe beneath the orbit. This species fully proves the judiciousness of the separation of *Philoscia* from *Oniscus*.

In the same paper I also proposed the foundation of a new genus, *Philougria*, for the reception of a small Oniscoid, which is extremely common, but which, undescribed in this country, was also apparently undescribed on the Continent; at the time I stated my suspicions that the genus *Itea* of Koch had been misdescribed; but, owing to want of proper figures, I did not feel justified in identifying my specimens, to which I gave the name of *Philougria celer*, with the *Itea riparia* of Koch, for I found the genus described by Koch as having only one joint in the tige of the antennæ, and even Zaddach, who has noted and corrected this error, and has given an admirably accurate description of two species, used such terms as these:—"Antennæ interiores magis etiam diminuta quam in *Philoscia* ex uno modo articulo constare videntur:" a description which any one who examines the description of *Philougria rosea* of this present paper will find to be most incorrect; the antennæ in that species projecting so far beyond the front as to be visible to the unassisted eye from above.

During the past summer I was fortunate enough to meet with two other species of the same genus, which are identical with two out of the four species already described as *Itea* by Koch and Zaddach; and by help of these it appears to me that we are justified in assuming that both Zaddach and Koch erred in regard to the characters of the internal antennæ. The genus *Itea* being, then, inaccurately described, and furthermore the name having been long ago appropriated to a well-known genus of plants by Linnæus, I would suggest that the generic name suggested by me last year should still stand, and the name *Itea* be altogether erased from the carcinological lists; the only species of it which does not come into the present genus being the *Itea crassicornis* of Koch, which is seemingly a *Platyarthrus* of Brandt. The examination of the two additional species obliges me to modify some of the minor characters of the genus, as published in my analysis, and the abolition of the generic term *Itea* necessitates the substitution of *Philougridae* for *Iteadæ* as the name of the family. This, as it now stands, includes *Trichoniscus* (Brandt), should this genus prove distinct.

Family.—PHILOUGRIDÆ.

Genus 1.—TRICHONISCUS (*Brandt*).Genus 2.—PHILOUGRIA (*Kinahan*).ITEA (*Koch*) (in part).

Telson coxæ perparvulæ. Pleopoda posteriora nuda, in sinu marginis exterioris telson articulata; basis triangularis; ischium appendiculatum, trigone-subulatum; lobus accessorius satis magnus. Antenn. extern. 3 articulatae. Antenn. extern. pedunculum non lobatum; filamentum subulatum, 5 articulatum læve, filo abeuns. Cingulum abdominis coxæ, primi parvæ, 2di, 3tii, 4ti, 5tique lineares. Carapacis frons nec medianè nec lateralitè lobatus. Antennarum superiorum cingulum infra oculos lobo abeuns. (*Ph. riparia*, *Ph. rosea*, *Ph. vivida*.)

1.—*Philougria riparia* (*Koch*, *sp.*) Plate XXIII., Fig. 1.

Corpore lævi, splendido, elliptico. Antenn. intern. parvulis inconspicuis. Antennis externis ut *genus*. Telson supra pleopod. posterior. maxime excavato, truncato-triangulari, apice emarginato.

Sub musco, frondibus, lapidibusque ubique in locis madidis totam per Hiberniam et Angliam, hæc species, dispersa esse, videtur, rarius in Comitatus meridionalibus.

Longitudo, .15 unc.

2.—*Philougria vivida* (*Koch*, *sp.*).

Corpore lævi, splendido, *ovali*. Telson truncatè-triangulari; apice pæne recto, *superne profunde sulcato*, non emarginato.

Colore: fusco subtilissime albide-maculato.

Sub musco, lapidibusque in collibus ad "Portlaw, Com. Waterford," Hiberniam, non rare inveniam.

Longitudo, .25 unc.

3.—*Philougria rosea* (*Koch*, *sp.*).

Corpore scabro, tuberculato. Oculis minutis. Antennis internis, conspicuis, ante frontem extendentibus. Abdominis cingulis, 1mo, 2do, 3tioque, granulatis; 4to, 5toque lævibus. Telson lateribus excavatis, apice truncato, recto; cæteris ut *Phil. riparia*.

Colore miniaceo-rubro, albido suffuso, aut albo. Longitudo, .15 unc.

In horto, cellariisque, ad Plymouth, Com. Devon, Angliam, amicus meus Car. Spence Bate, F. L. S., hanc speciem observavit, ubi etiam non rarius egomet inveni.

PHILOUGRIA (*Kinahan*), *Itea* (*Koch*, in part).

Body flattened; no lateral or median lobes to the front; internal antennæ three-jointed; external antennæ, second articulation rounded, unlobed; tige subulate, five-jointed, smooth; posterior pleopods completely uncovered, articulated in a notch at posterior margin of telson. Peduncle (basis) triangular, appendiculate; Ischium trigonal, smooth,

generally terminating in a set of filaments. Accessory appendage well marked.

1.—*Philougria riparia* (Koch, sp.). Plate XXIII., Fig. 1.

Synonyms: *Itea riparia* (Koch), *Itea laevis* (?) (Zaddach), *Philougria celer* (Kinahan, olim).

Body smooth and shining, elliptical; head oval; antennal plate attaining to frontal line, its external angles produced as small lobes beneath the orbits; internal antennæ small and inconspicuous; external antennæ of moderate length, carried folded at an angle. Telson deeply excavate over insertion of posterior pleopods, medianly produced, truncately triangular, deeply emarginate.

Length, .15 inch.

Colour: uniform claret-brown; under the lens, most exquisitely marbled with white.

Habits: runs with great agility; buries itself deep in the earth; very impatient of drought; feigns death, but does not even semi-roll. I have found it with ova and young in the months of February to November.

Habitat: very moist places, among decaying vegetable matter, at roots of trees; under moss everywhere.

Localities: Dublin (Wexford, Cork, Kerry, E. P. W.), Tyrone; Waterford; Portlaw, rather rare; Kilkenny; Wicklow; Queen's County. England:—London; Kent; Plymouth, not so common; Polperro, Cornwall, not uncommon.

The young (?) specimens have the head slightly scabrous. A number of fine hairs (visible under an inch glass) are scattered over the rings.

The elliptical outline of the entire animal, its smaller size, the characters of the telson and of the skin (Plate XXIII., Fig. 1 f), which here is without pits, distinguish it from *Ph. vivida*, with which it might be confounded.

2.—*Philougria vivida* (Koch, sp.).

Syn.—*Itea vivida* (Koch), *Itea nana* (Koch (?), Junior). Plate XXIII., Fig. 2.

Body smooth, shining, oval. Telson truncately triangular; the apex nearly straight, deeply furrowed above, but not emarginate. Posterior pleopods and ischium trigono-subulate.

Colour: Claret-brown; under the lens, marbled with white.

Length: .25 inch.

Habits: runs with great agility; does not bury itself; less impatient of moisture than *Ph. riparia*.

Habitat: under stones and amidst moss on the high grounds.

Locality: hills and high ground, about Portlaw, county of Waterford, where I met this species in great abundance in March, 1858, even in the midst of snow.

The superior size and the robust rotundity of this species distinguish it at a glance from *Phil. riparia*. Other characteristics are afforded by the form of the telson, which is only seemingly emarginate at the tip; and by the integument, which in this species is covered with a series of small pits (Plate XXIII., Fig. 2 f). The habits and favourite localities of the two are very distinct.

Koch founded the species on specimens brought from Vienna by M. Jenisson; the exact locality unknown. *Itea nana*, which appears to differ only in colour, was from the same collection.

PHILOUGRIA ROSEA (Koch). Plate XXIII., Fig. 3.

Synonym :—*Itea rosea* (Koch).

Body, except posterior abdominal rings, tuberculated; eyes very small, black, and conspicuous; internal antennæ very conspicuous, extending beyond front; lateral angles of antennal ring strongly marked beneath orbits; telson plane above, apex rounded, with four (?) strong bristles; external antennæ hairy; cephalo-thoracic rings and head coarsely granulated, the granules each bearing a bristle; abdominal rings, first to third granulated; fourth, fifth, and telson smooth.

Colour: clear minium-rose, with white dots, and a white stripe down the median line, or a dead white with a dark median line.

Length .15 inch.

Habits much the same as the rest of the group; seems to be more humid in its haunts; does not roll; feigns death; and is not quite as active as either of the other species.

Habitat: in damp places, in gardens and courts, and in dark cellars (the pure white variety).

Localities: the first specimen of this species I saw was taken at Plymouth by my friend C. Spence Bate, F. L. S., in his cellar. On a further search there and in his court-yard I found the species abundantly. I never met it elsewhere.

For the drawings of this and the other species I am indebted to my friend Charles Spence Bate, F. L. S.

Koch states that the species is not common in Germany. *Itea Mengii*, of Zaddach, which at one time I was inclined to look on as this species, I am now rather inclined to identify with specimens which I have obtained in Donnybrook, and which, though differing from *Ph. riparia* in the following points—head scabrous; cephalo-thoracic rings covered with rough granulations, abdomen nearly same width as cephalo-thorax; telson not emarginate; colour, white, with dark stripes—I still hesitate to separate from that species of which I suspect they are the young state.

The only terms used in this Paper, additional to those in the Analysis, are—*telson* (last abdominal ring), and *posterior pleopoda* (last pair of appendages), both of which I have adopted from Spence Bate's Report on the British Amphipoda, at the same time wishing to guard myself from being supposed to have adopted the idea that there are three primary divisions of the crustacean body, viz., kephalon (head), pereion (thorax),

pleon (abdomen). I cannot satisfy myself that in the type Crustacea of twenty-one rings we have more than two primary divisions, viz., fourteen anterior rings (cephalo-thorax), seven posterior rings (abdomen). In some genera and groups we find (as Amphipoda) the first of these split up secondarily into two parts, and here it doubtless is convenient to name each of the parts. Used in this subordinate sense, the terms head, cephalon (or what I conceive means the same thing), *carapace* (as correctly used), and pereion, or thorax, may be used. Abdomen and pleon are confessedly identical—the only objection to the former term being, that it has been used to express an organ among the Vertebrata, an objection which, perhaps, after all does not signify much. The appendages of the segments, however, much need distinctive names, and there can be no objection to those suggested in the Report alluded to. Telson, in the same manner, appears to be an organ which is constant in its relations, and a most important one, specifically speaking, among the Isopoda.

I would suggest the following alterations in the sequence of the families of Oniscoidea as given in the Analysis:—

Tylidæ, Actæcidæ, Porcellionidæ, Oniscidæ, Philoscidæ (Philoscia, Scyphax), Philougridæ, Titanethidæ (Titanethes, Styloniscus, Ligidium), Ligidæ.

DESCRIPTION OF PLATE XXIII.

- Fig. 1. *Philougría riparia* magnified:—1 *b*, posterior pleopod; 1 *f*, microscopic appearance of integument.
 Fig. 2. *Phil. vivida*:—2 *d*, posterior pleopod; 2 *c*, inferior view of antennæ; 1 *e* and 2 *e*, internal antenna; 2 *f*, integument.
 Fig. 3. *Phil. rosea*:—3 *b*, telson and posterior pleopod; 3 *c*, inferior view of head; 3 *f*, integument.
 Fig. 4. *Philoscia Couchii*:—4 *b*, telson and posterior pleopod; 4 *d*, posterior pleopod.

The President declared the following gentlemen duly elected:—

HONORARY MEMBER.—Charles Spence Bate, F. L. S., Plymouth.

CORRESPONDING MEMBER.—James Martin, M. D., Portlaw.

ORDINARY MEMBERS.—John M'Ilwaine, Esq., Dublin; M. Weld O'Connor, Esq., Dublin; Robert Samuel Reeves, Esq., Dublin.

The Meeting then adjourned to the month of June.

FRIDAY EVENING, JUNE 4, 1858.

CHARLES P. CROKER, M. D., M. R. I. A., VICE-PRESIDENT, in the Chair.

THE previous Minutes having been read and signed,—

MR. J. B. DOYLE read the following paper—

ON SOME PECULIARITIES OF HABIT IN THE DODDER PLANT (*CUSCUTA*
EPITHYMUM).

It is well known to botanists that there is a curious group of plants known by the name of *Parasites*, which derive the whole or the greater portion of their nutriment from other plants. Some of these, as the mistletoe, have leaves of their own, and others, as the Dodder, have none, but only naked filaments, studded in the season with small tufts of flowers of a delicate pinkish-white. It is believed by some that there is a corresponding difference in their mode of feeding, the former having leaves of its own, feeding upon the ascending or unelaborated; the latter upon the descending or perfected sap.

Having spent some weeks, last summer, in South Devon, I paid a visit to Dartmoor Forest, and spent some very pleasant hours botanizing over the Moor.

In the course of my ramble my attention was arrested by the strange appearance of the gorse or furze, which at a little distance appeared to have a delicate pinkish hue pervading its green and prickly branches. Upon close examination I found that this was occasioned by the intermingling of a vast number of naked filaments or tendrils, studded with most elegant little waxy flowers, of a delicate French white colour.

A botanical friend explained that this curious plant was the *Cuscuta epithymum*, or Dodder plant.

To those who, for the first time, recognise a plant or specimen which they had previously known only from description, I need not describe the pleasure with which I examined this curious, very beautiful, but very mischievous little plant.

But my attention was soon arrested by a curious and, I believe, a very interesting discovery. Upon one of the specimens I observed two blossoms of the moor heath (*E. cinerea*) in vigorous health, growing upon a filament of the Dodder.

Upon closely examining the immediate locality, I found a stool of heath within less than a yard of the furze bush, from which I took the specimen now on the table.

There could be no doubt that the blossoms in question had been excised from the heath by the tendrils of the Dodder, and so completely were they incorporated that they did not miss their removal from the parent bush, but appeared to be nourished by the juices of the intrusive plant, and thus presented the novel feature of being a parasite in turn upon the true parasite which had borne them off.

The most curious part of the circumstance was that the Dodder, having excised the two pretty heath flowers, went forward on its rambles, throwing its lasso round a spray of the furze bush, striking into it fresh rootlets to support itself on its devious way, carrying intact its precious burden through the thorny maze.

I submit the fact for the consideration of the Society, leaving it for them to determine the interesting question as to whether the heath flowers were in reality nourished and bloomed by the juices of the Dodder, or only kept alive by the moisture of its succulent tendrils.

I trust I may be excused for bringing this circumstance under the notice of the Society. If the "Rape of the Lock" was a sufficient theme for Pope, surely a naturalist may be excused for noticing the abduction of this pretty little flower by one of the wild denizens of Dartmoor, especially as the robber is the more worthy of consideration, from the care he took of his beautiful protege.

PROFESSOR KINAHAN, M. D., read a paper—

ON THE GENUS SCORPIONURA (J. V. THOMPSON, MSS.).

IN the fourth volume of the "Natural History of Ireland," by W. Thompson, are recorded, by name only, three species of decapodous Crustacea, under the names of *Scorpionura vulgaris*, *Scorp. maxima*, and *Scorp. longicornis*. No description of this genus having been ever published, it is a matter of some moment to identify the species thus named, and which now exist in the collection of the Royal Dublin Society. I, therefore, gladly avail myself of the kind permission of our Honorary Member, Charles Spence Bate, F. L. S., to lay before you to-night the results to which he has arrived on examination of these specimens, and at the same time beg to record a locality for one of the species in the neighbourhood of Dublin. I prefer this course to myself drawing up any description of the species, as Mr. Spence Bate has already so thoroughly studied the family (the Diastylidæ), to which these species are referable, as to render it presumptuous on my part to offer any remarks on the structure of the animals.

My object in this communication is confined to proving, through the identification of these specimens, that the genus thus named by the late J. V. Thompson must be erased from our lists, the species composing it falling under the following genera:—*Diastylis* (*Say*), *Cyrianassa* (*Sp. Bate*), and a new genus for which Mr. Spence Bate suggests the name of *Vaunthompsonia*. At one time Mr. Spence Bate thought of retaining the name *Scorpionura* for this last genus; but that name being already pre-occupied, he has thought it better to call the genus after the discoverer of the Irish species.

It is extremely interesting to find among this collection—probably among the great haul made on the 28th April, 1823—several specimens of females with ova, showing that their observer was aware of these being adult forms, and adding another to the species recorded by Spence Bate as bearing this strong proof of these being mature, and not, as has been stated by some of our best authorities, the zoes of some of the *Macroura*. I have extracted Mr. Bate's communication and figures *in extenso* from the "Journal of the Royal Dublin Society," before whose evening meeting of the 28th May it was read.

DIASTYLIS RATHKII (*Kr. sp.*). SCORPIONURA VULGARIS (*J. V. Th. MSS.*)
 ALAUNA ROSTRATA (*Goodsir*). CUMA RATHKII (*Kroyer*).

Dublin : near Skerries, by the late Robert Ball, LL. D. (*vide* Thompson's "Natural History," vol. iv., p. 392); Newcastle, Co. Down (W. Thompson). I have not verified this last. South of Ireland (J. V. Thompson).

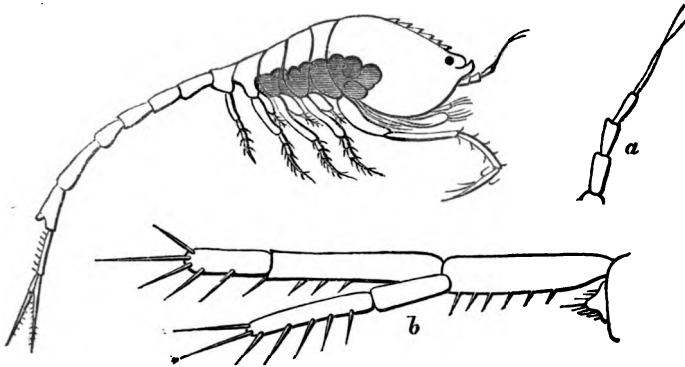
"VAUNTHOMPSONIA (*Spence Bate*).

"Carapax angulos laterales ante oculos convenientes. Antennæ superiores nullæ. *Perei* segmenta quinque posteriora carapace nuda. *Pleopoda* pare ultimo excepto, absunt. *Telson* perparvulum.

"The lateral angles of the carapax meeting before the eyes; upper antennæ wanting; five posterior segments of the *perei*on (thorax) not covered by the carapax; all the pleopoda, the last pair excepted, absent; telson rudimentary.

VAUNTHOMPSONIA CRISTATA (*Sp. Bate*).

SCORPIONURA VULGARIS (*J. V. Thompson*).



a, antenna; b, posterior pleopod.

"Carapacis regione dorsali medio cristato, denticulato.

"The anterior portion of the central dorsal region of the carapace with a ridge of minute teeth; lower antennæ, four joints, the last a filamentary appendage; posterior pleopoda, with their rami unequally two-jointed, as long as the peduncle, and armed with stout spines arranged chiefly along the inner margin; telson triangular, squamiferous, ciliated.

"Length .25 inch.

"The figure and description are from a female carrying ova; there are several specimens in the collection, two of them with ova.

"This species approximates nearer to *Cuma Edwardsii* (*Kroyer*) than

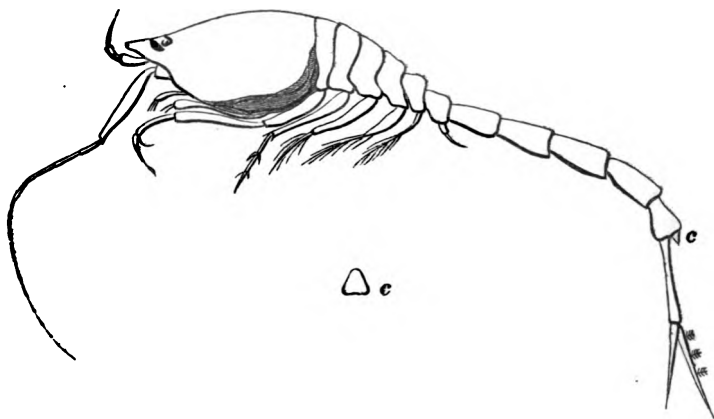
to any other I am acquainted with. It probably forms with it, as suggested in my memoir on the British Diastylidæ ('Annals, Nat. Hist.,' 1856), a genus distinct from *Cuma*, and which may be readily distinguished by the character of the *five* segments of the *pereion* being perfectly developed posterior to the carapace, whereas in *Cuma* there are but *four* thus developed.

"Although I have not had an opportunity of dissecting a typical species of the genus *Cuma*, I do not hesitate to group the present species, and probably *C. Edwardsii*, as distinct from *Cuma*, since Goodsir asserts that both antennæ are present in those *Cumæ* which he examined, the upper in a rudimentary state, a character which I cannot find in *V. cristata*; this, taken with the altered condition of the *pereion*, justifies the presumption of a generic distinction.

"In selecting a name, I have fixed on that of the discoverer, being one which is familiar to every carcinologist, and to which honour is due for valuable discoveries in this department of zoology. More than one of the name having been eminent as a naturalist, a license has been taken,—the Christian name has been incorporated with the surname, and both spelled according to sound: the word is thus both shortened and rendered more easy for pronunciation by foreigners.

CYRIANASSA LONGICORNIS (*J. V. Thompson, MSS. sp.*).

"Pleopodis, paribus primo et sexto exceptis, nullis. Ceteris ut *Cyr. gracilis*.



"No pleopoda developed on the second, third, fourth, and fifth segments; the other characters as *C. gracilis*.

"All the appendages of the pleon are suppressed, except the first and sixth pairs; telson squamiform and rudimentary.

"Length, .15 inch.

"In the higher forms of Crustacea the pleopoda in the male are often altered in form, and sometimes even wanting, except when they are subservient to the sexual character. It may be, therefore, that the difference between the present species and *C. gracilis* is one of sex only.

"A single specimen in the Royal Dublin Society's collection is the only one I have seen.

"The specimen is shorter and more robust than *C. gracilis*; the segments are brought closer together; the dorsal line of the *kephalon* and *pereion* is more arched; the antepenultimate joints of the lower antennæ do not extend beyond the anterior margin of the carapace. I have, therefore, thought it advisable for the present to retain Thompson's name, rather than absorb the species into that previously described. Having seen but a single specimen of each, I have not had the advantage of dissection to compare their separate details."—*On a new Genus and new Species of Diastylidae*, by C. Spence Bate, F. L. S. : Journal of the Royal Dublin Society, vol. ii., p. 101.

Other members of the group have occurred on the coast of Galway to Professor Melville, which I hope may be also brought at some future period before your Society.

Mr. Stephen M. Yeates exhibited a beautiful modification of the gas microscope, showing its applicability to illustration of microscopic preparations, as, owing to modifications in the structure of the instruments, it is possible, at a very slight expense, to exhibit to an audience objects which require high magnifying powers. Specimens of *Arachnodiscus*, and dissections of many insects, were distinctly shown. Photographs taken from objects by means of the instrument were also exhibited.

The Chairman declared Mr. William Laughrin, of Polperro, duly elected a Corresponding Member.

The Society then adjourned to November, 1858.

NOTE on *Pandalus Jeffreysii* (Spence Bate), and *Pandalus Leptorhynchus* (Kinahan).—A critical examination of *Pandalus Jeffreysii*, through the kindness of its discoverer, has proved to me that the species of *Æsop* prawn found by me at Sandycove, and recorded in the December Meeting of the Natural History Society (*vide ante*), is distinct. The name *P. leptorhynchus* must, therefore, as suggested provisionally, be applied to the new species, *P. Jeffreysii* not yet being recorded as Irish.—J. R. KINAHAN, M. D., June 8, 1858.

NOTE on *Pagurus Eblanensis*, pp. 31, 32, 51.—On examination of the typical specimens of *Pagurus Ulidianus* (Thompson), preserved in the Belfast Museum, it appears that my surmise (p. 51) as to the identity of *P. Ulidianus* and *P. Eblanensis* is well founded: the former name must, therefore, fall. Examination of living specimens, dredged by me in Bangor Bay, county of Down, confirms this. The true range of the species, then, is—

P. Ulidianus, Belfast Bay, Portaferry (W. T.); Dublin Bay (J. R. K.); Galway (A. G. M.).—J. R. K., August, 1858.

*

ILLUSTRATIONS OF THE FOSSIL FLORA OF THE LOWER CARBONIFEROUS BEDS OF IRELAND. BY THE REV. SAMUEL HAUGHTON, F. T. C. D., AND PROFESSOR OF GEOLOGY IN THE UNIVERSITY OF DUBLIN.

PLATE VIII. represents, on a scale one-half that of nature, a fine specimen of *Knorria* (named *Sagenaria Veltheimii* (Sternberg), and *Knorria imbricata* (Göppert), by the German palæontologists). It is a cast of the woody axis of this genus, and exhibits well the dichotomous arrangement of its branches, and the imbricated, spirally-arranged leaf-scars characteristic of the *Lepidodendra*, to which it is evidently allied.

Locality : Hayntren, Saxony.

Geol. horizon : Base of the Lower Carboniferous.

I have introduced this for the purpose of contrasting it with the following :—

Plate IX., Figs. 1 and 2.—Side view and cross section of imperfectly preserved stem of plant, showing central coaly axis and longitudinal striations on external surface; natural size. I cannot refer this plant satisfactorily to any known form. It is a cast of the woody axis of some form of Lycopodiaceous or Endogenous plant; but the central tube presents a structure different from that of any recent forms.

Locality : Harrylock Bay, county of Wexford.

Geol. horizon : Yellow sandstone, 380 feet below the lowest bed of Carboniferous Limestone.

Plate IX., Fig. 3.—Natural size; stem of smaller branch of same plant as last, showing bases of leaves at lower portion of external surface. The peculiarity of this specimen consists in the spiral tube, filled with coaly matter or peroxide of iron, which twines round the stem, as shown in the figure. Professor Phillips, of Oxford, has suggested to me that it may (possibly) be the stem of some kind of twining fern, which has compressed the stem so closely as to penetrate below the external surface. The bases of the spinous leaves are well shown in the figure.

Locality : Harrylock Bay, county of Wexford.

Geol. horizon : Same as last.

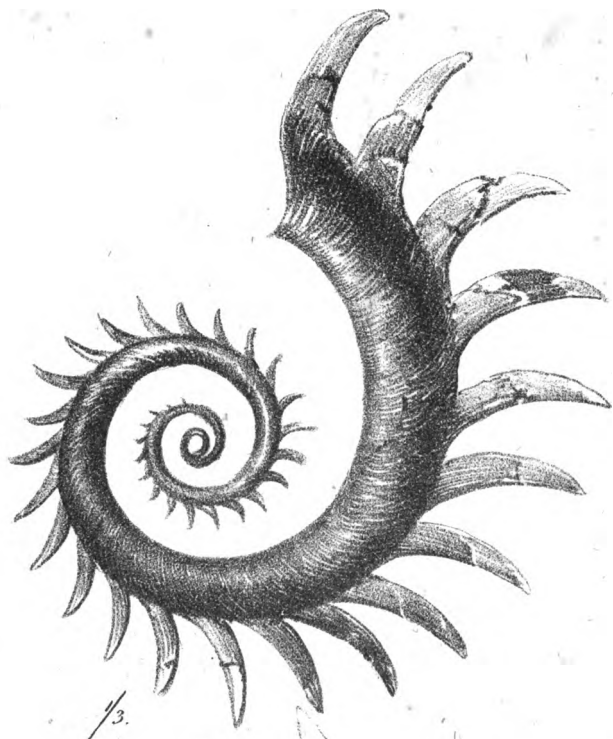


Fig 1.

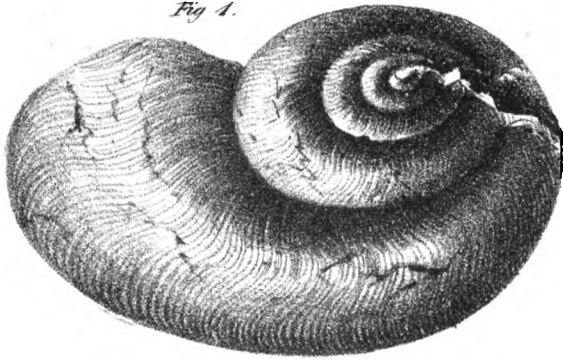


Fig 2.

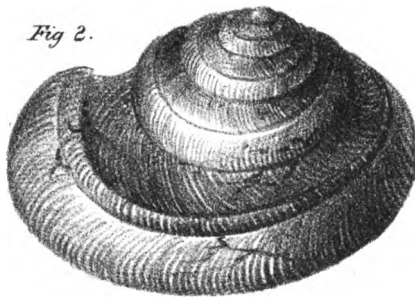


Fig 3.

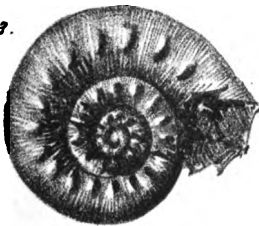
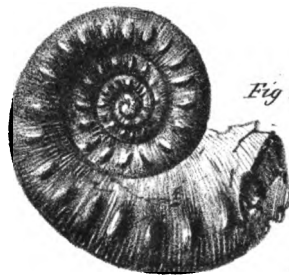
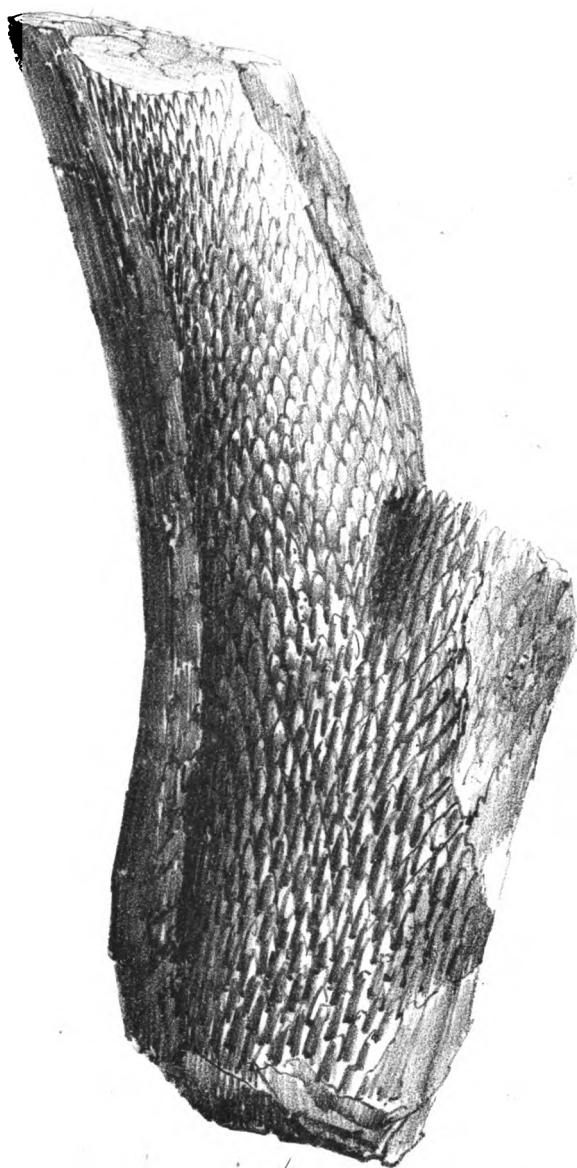


Fig 4.





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Fig. 1.

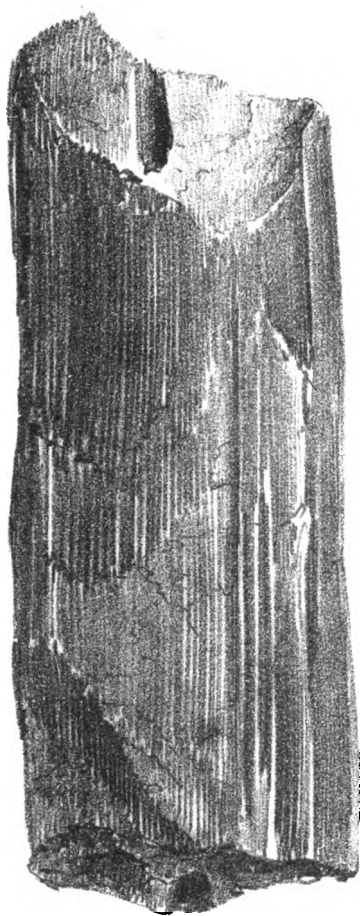
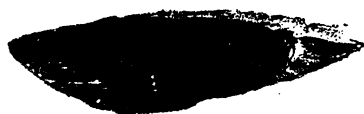
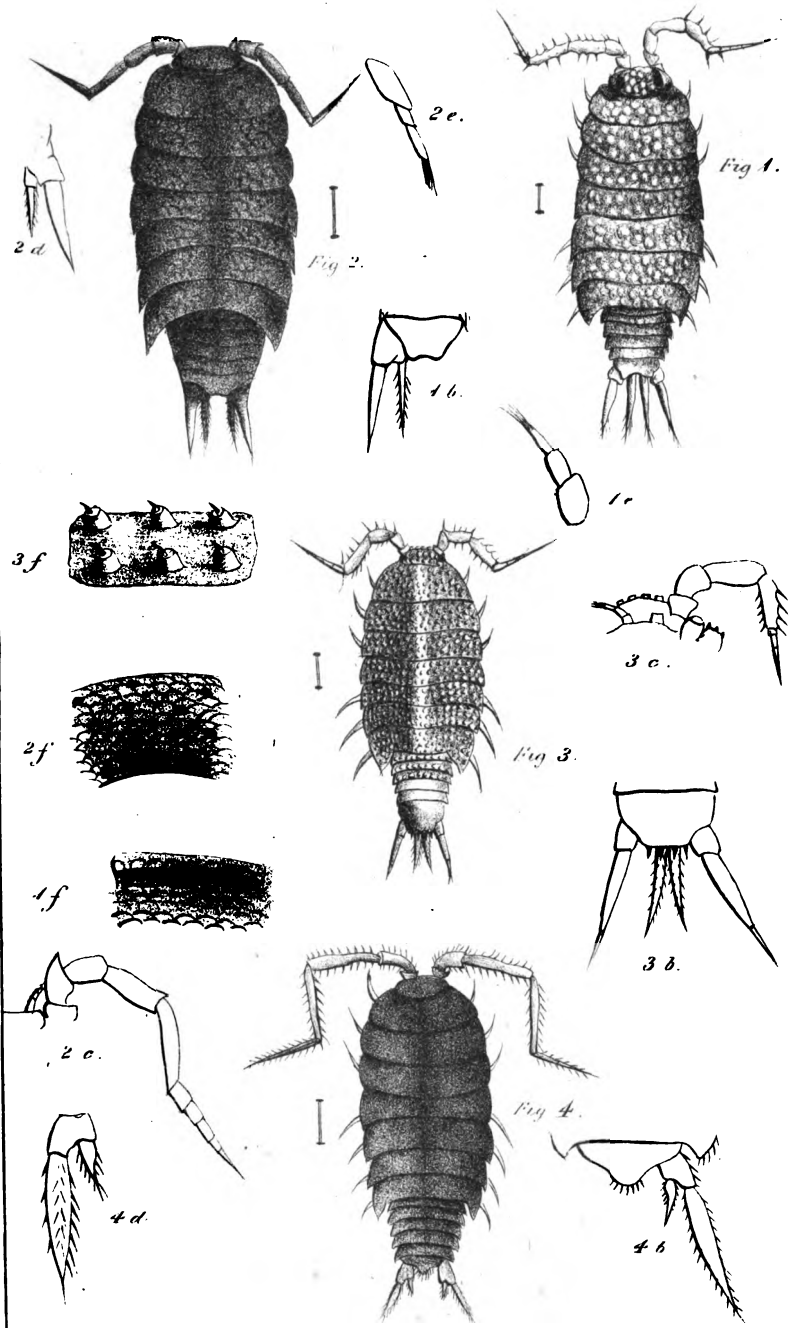


Fig. 3.



Fig. 2.





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OF THE

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Nov. 20, 1917
S-E-S-D

PROCEEDINGS

OF THE

NATURAL HISTORY SOCIETY OF DUBLIN,

FOR THE



SESSION 1858-59. no 3

~~VOLUME I. PART III.~~

p. 123-214

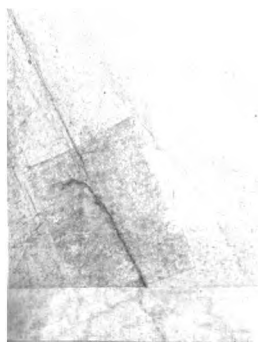
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SESSION 1858-1859.



FRIDAY EVENING, NOVEMBER 8, 1858.

PROFESSOR W. H. HARVEY, M.D., F.R.S., F.L.S., M.R.I.A.,
PRESIDENT, in the Chair.

The Minutes of the previous Meeting having been read, were confirmed and signed. The Secretary then read the following—

REPORT OF COUNCIL.

TWENTY years have now elapsed since the foundation of this Society, and your Council, in returning into your hands the trust confided to it last November, has much gratification in being able to announce to you that the Session now concluded has proved no exception in success to the three or four immediately preceding it.

In addition to the advantages secured to this Society by the possession of commodious meeting-rooms and museum, your members now receive at the commencement of each Session a copy of the more important Proceedings of your meetings, during the previous Session, in a connected and convenient form—those Proceedings, as corrected by your Secretaries, having previously appeared quarterly, and enjoyed the benefit of the circulation of the "Quarterly Journal of Science" among most of the scientific institutes of the United Kingdom and the Continent, along with the proceedings of the other scientific institutions of the metropolis, thereby rendering the discoveries, &c., brought before your Society, known to the scientific world at large.

The losses of members during the past year have been, of Ordinary Members, two: J. F. Darley, Esq., and V. W. M'Nally, Esq., by resignation, the latter on his departure from Ireland; and of Honorary Members by death, Sir P. Crampton, Bart., M.D., elected in 1838. Eleven Ordinary, one Associate, and four Corresponding Members have been elected during the Session, so that the total gain to the Society has been fourteen. Charles Spence Bate, F.L.S., of Plymouth, who has contributed two papers to your Transactions, has been elected an Honorary Member. Your Society thus now consists of fourteen Honorary, ninety-seven Ordinary, and thirty-four Associate and Corresponding Members.

The donations during the year included several rare and type specimens. An Irish specimen of the mute swan (*Cygnus olor*) presented by Lord Clermont, and a nearly perfect skeleton of the gigantic elk (*Megaceros Hibernicus*), presented by Richard Barnewall, Esq., especially call for notice.

The steady progress of your Society for some Sessions past has at length enabled your Council to pay off the old debt of £58, due to your

Treasurers since 1845, as well as outstanding liabilities incurred during the famine years. This has compelled it to diminish the reserve fund by the former amount, and has caused an apparent deficit on the Society's side of the Treasurer's account for the year; this latter, however, is more than covered by the arrears of subscriptions due, and the Council hopes that through the exertions of the present members such an accession will be made to the list of the members as will enable the Council soon to announce as large a balance in the reserve fund as in the former years.

The yearly necessary expenses of your Society, as stated in former reports, at present leave but a small balance to pay for printing, &c., the Proceedings; and your Council fears that, unless an increase take place to the present income, the present advantageous arrangement, as regards this most useful adjunct to your meetings, must be abandoned. The back Proceedings for the years 1849 to 1855 also, as yet, remain unprinted, save in the columns of "Saunders's News-Letter;" and your Council finds among these many communications which it would be highly desirable to reprint, and thus preserve for reference. This could be done uniformly with the first part of your Proceedings, at a cost of not more than £15 or £20,—an expenditure which, however desirable, the present state of the funds will not justify.

The term of office for which your President, Professor W. H. Harvey, M. D., has been elected, having expired, your Council feels that it could not select a more fitting successor to the office than the gentleman who has now, for so many years, filled the post of Secretary, William Andrews, Esq., and have, therefore, much pleasure in recommending him to the members for election, feeling confident that in so doing it will meet with the approbation of the Society, for affording this Meeting an opportunity of marking its sense of the services rendered to the Society during a long series of years, in common with many other of the old members; and also for consulting the Society's best interest, by placing in the responsible post of President of the Natural History Society of Dublin one whose name in England and on the Continent, as well as in this country, has been for many years identified with original research in Irish Natural History.

Among the list of your Vice-Presidents appears the name of one, to whom, in this, your twenty-first year, your Council deems that it would be failing in its duty did it not afford the members an opportunity of acknowledging the kindness, which, in spite of multifarious public duties, was displayed towards, and took an active part in, the proceedings of the Society, acting as your President for upwards of eleven years, and at all times exhibiting an interest in the well-being and welfare of the Society. The Council, therefore, feeling that the time has at length come for the Society to mark its deep sense of gratitude towards his Grace the Lord Archbishop of Dublin, for the anxiety displayed by him for the promotion of natural science in Dublin, proposes that we place his name permanently on our rolls as Patron of the Society, feeling that in this recommendation it is but expressing the feelings of the Society at large

as to the value of the services rendered by his Grace. A resolution to this effect has been accordingly prepared, to be submitted to the Meeting.

Your Council also feels that it cannot separate without recording its thanks to the gentleman who, during the past two Sessions, has honoured us by presiding at our meetings, well knowing that this must have been done at a great sacrifice of leisure hours, at all times a great personal inconvenience, but more especially so to a scientific man so occupied by public duties as our respected President.

Mr. Andrews's recommendation for President having caused a vacancy in the Secretaryship, your Council recommend the election of Mr. William Archer to that post. Your Treasurer's accounts will afford more particular information as regards the present prospects of the Society in a pecuniary point of view.

In conclusion, your Council have to announce that from the notices of papers already submitted, it has every reason to believe that the Session now commencing will yield in interest to none past; and hope that, by the exertions of the Members, the incoming Council will be able to report at our next Stated Meeting as great an increase of Members as that which has been shown by our books at the conclusion of your last four Sessions.

Mr. William Andrews moved, Mr. Robert Callwell seconded; passed by acclamation, *nem. con.*:—

“That his Grace the Lord Archbishop of Dublin be elected as perpetual Patron of the Society.”

The President moved the adoption of the Report, which passed.

The Treasurer submitted his Report, showing that during the past year the receipts amounted to £83; to Reserve Fund, £10; disbursements, £95 15s. 11d.—leaving a balance in favour of Treasurer of £12 15s. 11d. Reserve Fund, £61. Subscriptions were due, as arrears, which more than covered the deficit; and amongst the items disbursed, £16 were for old debts of the Society.

The ballot for Officers having closed, Professor Harvey declared the following duly elected:—

PATRON.—His Grace the Archbishop of Dublin.

PRESIDENT.—William Andrews, M.R.I.A., &c.

VICE-PRESIDENTS.—William H. Harvey, M.D., M.R.I.A., F.R.S., F.L.S., &c.; Sir Edward R. Borough, Bart., M.R.I.A.; C. P. Croker, M.D., M.R.I.A.; Rev. Samuel Haughton, F.T.C.D., M.R.I.A., F.R.S.

COUNCIL.—John Aldridge, M.D., M.R.I.A.; F. W. Brady; Robert Callwell, M.R.I.A.; James R. Dombrain; Rev. J. A. Galbraith, F.T.C.D., M.R.I.A.; S. Gordon, M.D., M.R.I.A.; A. H. Haliday, M.R.I.A., F.L.S.; William Hodges; Rev. Eugene O'Meara; G. B. Owens, M.D.; Gilbert Sanders, M.R.I.A.; E. Perceval Wright, M.B., M.R.I.A.

TREASURER.—Richard P. Williams, M. R. I. A.

DIRECTOR OF MUSEUM.—Robert J. Montgomery.

SECRETARIES.—John R. Kinahan, M. D., M. R. I. A., F. L. S.; William Archer.

Professor Harvey then left the chair, which was taken by—

WILLIAM ANDREWS, Esq., M. R. I. A., PRESIDENT.

Professor Harvey briefly returned thanks to the Society for the position in which they had placed him during the past two Sessions, and congratulated the Meeting on the choice just made in electing, as his successor, a member whose exertions for the Society, through many years, were too well known to the Society to need any comment on his part.

. **THE PRESIDENT** then made the following observations:—

GENTLEMEN,—In returning thanks to the Society for the very flattering and high position in which it has placed me, I cannot but feel diffident in accepting such a post, more especially as successor to one so distinguished for his high mental qualifications, and his untiring zeal in following out those branches of science that he has so successfully advanced. I cannot but feel gratified, however, at being chosen, and especially at the reason suggested for my election—that the Presidentship of this Society should be looked on as a post of honour, to be conferred on those members who have distinguished themselves in the cause of science, and in the desire to promote the interests of the Society.

I have now nearly completed eighteen years as one of your Secretaries; and I cannot but feel deeply grateful for the unvaried confidence, kindness, and support that have at all times been given to me by the members, and for the kind and zealous co-operation of those gentlemen who have been associated with me in office. It is needless for me to dwell upon the vicissitudes and difficulties that the Society has passed through during the period; but a uniform line of integrity in carrying out and promoting the objects for which the Society was established has enabled it to continue, without cessation or interruption, its annual Sessions, and now to present among its list of officers the names of many gentlemen maintaining the highest positions in science.

So suddenly, I may say, has this honour been made known to me, that it does not permit my giving details of the objects which influence our meetings. Indeed, it would have been an unnecessary task, for they have been oft repeated. I may merely remark, that although the workings of this Society are chiefly confined to the elucidation of such objects in this country as relate to the Natural Sciences; and notwithstanding all that has been hitherto accomplished independently of the recorded transactions of this Society,—we have still much to explore and to correct in the knowledge of our Natural History, which must give ample scope and reward to the zealous studies of the young aspirant. I cannot avoid mentioning a singular fact, that may stimulate us to put prominently

forward records of the Natural History of Ireland. Works have recently appeared, through London publishers, on the Zoology and Botany of the British Islands, and purporting to embrace that of Ireland; but, strange to say, the references with regard to this country are meagre in the extreme—objects of interest omitted, and erroneous views perpetuated. There is every prospect, however, of those difficulties being removed; and the want of information recently displayed by a small periodical, with regard to records of Irish Natural History, being amply cleared, and the merit of the Irish naturalist maintained, through the means of the enlarged sphere of publication furnished us by the extensive circulation of the “Quarterly Journal of Science”—a Journal that has rapidly and justly assumed a high scientific position.

It was proposed by C. P. Croker, M. D., V. P., seconded by Rev. Professor Haughton, V. P., and resolved unanimously:—

“That the thanks of the Society are due, and are hereby given, to our late President, Professor W. H. Harvey, M. D., for his kindness in presiding over our meetings for the two sessions past.”

It was proposed by James R. Dombain, Esq., seconded by C. P. Croker, M. D., and passed unanimously:—

“That a special vote of thanks is due to our Treasurer, R. P. Williams, Esq., for his unceasing exertions as Treasurer to this Society, since its foundation.”

The Meeting having been made special for election of Members, the following were duly elected:—

Ordinary Members:—C. Crowe, Esq., Dublin; Edward Hutton, M. D., Dublin.

Associate Members:—Robert Ball, Esq., Trinity College; George Porte, Esq., Dublin; Horatio Yeates, Esq., Dublin.

Corresponding Member:—Sandford Palmer, Esq., Ballinlough, Roscrea.

The Meeting then adjourned to the 3rd of December.

FRIDAY EVENING, DECEMBER 3, 1858.

WILLIAM ANDREWS, Esq., M. R. I. A., PRESIDENT, in the Chair.

The previous Minutes having been read, were confirmed.

The President, on behalf of R. J. Ussher, Esq., Cappagh, Cappoquin, presented a specimen of the black-cap warbler (*Curruca atricapilla*), shot at Cappagh, December 13, 1858. Mr. Ussher states that this bird is extremely rare here. Also from the same donor, the green sandpiper (*Totanus ochropus*), shot at Flower-hill, near Lismore, on the Blackwater, 13th August, 1856. This bird is likewise extremely uncommon.

Mr. James Haughton, Jun., Moorefield, Roebuck, presented a collection of Lepidoptera and Coleoptera, including a specimen of *Hydrelia Banksiana*, captured at Roebuck.

Thanks were voted for these donations.

PROFESSOR KINAHAN, M. D., F. L. S., read—

NOTES ON DREDGING IN BELFAST BAY, WITH A LIST OF SPECIES.

IN a communication entitled "On *Xantho rivulosa* and other Decapodous Crustacea, occurring at Valentia Island, county of Kerry" (*vide* "Proceedings Dublin Natural History Society," vol. ii., pp. 16 and 33; and *ante*, vol. iv., "Proceedings of Society," pp. 69 and 86), laid before your Society in 1856, I remarked on the fact that of the peculiar species found on the west coast, several were not met with on the Dublin shores, yet are common in the northern portions of the eastern coasts of Ireland; and, founded on this, I suggested that it appeared probable that a portion of this stream of western and southern species would seem to have, as it were, overlapped the northern portion of the island, and to have died out before reaching the Dublin, or, as I called it, the proper eastern district. An examination of Belfast and Carrickfergus Bays during the past summer, whilst affording me several previously unnoticed crustacea, has furnished me with additional proofs of this.

I allude to this theory the more particularly, because I learn that recently doubt has been expressed as to a similar distribution among the shells; and facts adduced by Messrs. Hyndman, Patterson, Waller, and Dickie, attempted to be explained away by supposing either that the southern and western types, quoted by those gentlemen, owed their presence here and in the list to pleistocene deposits, ocean currents, or possibly, as was also suggested, to some "Irish blunder." Now, as regards this latter, it ought to be sufficient that all the critical species had been identified by Alder, Gwyn Jeffreys, and other men of note on the other side of the Channel; and one of the species in dispute, *Odostomia conspiciua*, was named by its first discoverer in England, Mr. Alder; and if the objectors, instead of so readily prejudging the matter, had taken the trouble to cross the Channel, even a few days spent at Galway and Belfast would soon have satisfied them that as regards the common typical shells of the two ports, several in the latter places were much commoner and more typical there than further south-east, being in fact either South British or Lusitanian.

Tapes aurea, for instance, common in the west, not uncommon in Belfast, is unknown, as far as I can learn, in Dublin. *Mastra subtruncata*, rare in Dublin, common in the west, is also extremely common in Belfast. *Trochus magus*, a common littoral species in the west, unknown as such, as far as I can learn, in Dublin, is by no means rare as a littoral species in Carrickfergus. But it would consume too much time were I to notice all the species which illustrate this point; and there is not the slightest cause for wonder that such shells as *Chemnitzia scalaris*, *Ovula patula*, *Adeorbis subcarinata*, and *Rissoa striatula*, have occurred to the Belfast Dredging Committee.

The distribution of the crustacea affords data confirmatory of this; and Dr. E. Percival Wright, in a recent paper of his on Irish Actinia, has noticed the same point; and there appears to be little doubt that when the other sections of zoology shall have been accurately studied, the

same rule will be found to exist among them. My researches in Belfast and Carrickfergus Loughs included, amongst others, dredging excursions to Ballyholme Bay, Bangor, and Groomsport, in company with Professors Wyville Thompson and Redfern, and Mr. Edward Waller; and to the Gobbins and Blackhead, with the Rev. G. Payne and Professor Andrews. Here, in addition to other species, I met the following, previously unrecorded in the Belfast list, as published:—*Crangon fasciatus*, *C. Allmanni*, *C. sculptus*, *C. spinosus*, and a new species, which I mean to describe more fully at some subsequent meeting, and which I have called *Crangon Pattersonii*; *Hippolyte Cranchii*, *H. pusilla*, and *Galathea Andrewsii*. This latter occurred here in great numbers.

I should mention that on an examination of the specimens in the Belfast Museum, afforded me by the kindness of Messrs. R. Patterson and Hyndman, I found specimens of *Crangon Allmannii* and *Crangon fasciatus*, but marked in Mr. W. Thompson's handwriting as *C. vulgaris*—some of those obtained as far back as 1838.

Mr. Robert Patterson kindly accompanied me to Cultra and Crawfordsburn, where I found two amphipods, which have been first noticed by me as Irish—viz., *Gammarus palmatus*, which I found two years ago in Dublin, and *Orchestia Deshayesii*, which I had previously found at Carrickfergus. This latter is generally believed to be identical with the Egyptian species described by Savigny.

Floating on the sea, in the cavities of Acalephæ, *Hyperia galba* was met in immense numbers; and a *Lestrigonus*, which appears to be *L. Fabricii* of Edwards, and which I suppose is the species which, owing to its bad state of preservation, W. Thompson failed to identify.

I append a list of the principal species obtained, marking those decapods which do not occur in Dublin; and among the amphipods the species which are recorded there; our information regarding this group is, however, at present so scanty that it were dangerous to dwell too much on this group. I have also inserted here the species of both those and the isopods which I have met in Dublin, not Belfast, as some of them are unrecorded.

List of Species of Crustacea obtained in Belfast Lough.

[N. B.—The decapods of Belfast having been already enumerated by me in full in former papers, from William Thompson's list, and the specimens in the Ordnance Survey collection, I here note only such as require further notice.]

Thus marked (*) not found in Dublin.

Crustacea Decapoda.

Inachus dorycnchus.—Occurred not uncommonly in Ballyholme Bay and off Bangor; no other species occurred to us.

Eurynome aspera.—Ballyholme Bay and off Whitehead; does not appear to be rare.

Portunus puber.—Bangor.

Portunus corrugatus.—Bangor and Ballyholme Bays.

Portunus arcuatus.—Bangor.

Portunus depurator.—Ballyholme, Whitehead.

Portunus pusillus.—Groomsport and Whitehead.

Portunus holsatus.—A single specimen off Whitehead.

Bernhardus streblonyx.—Common everywhere.

**Bernhardus Prideauxii*.—I did not meet this species. Mr. J. C. Hyndman showed me several typical specimens of it; in my Dublin lists the range given is incorrect; one specimen only occurred to me there, and that imperfect.

Bernhardus Cuanensis.—Ballyholme and Whitehead.

Bernhardus Ulidianus.—This is the species which, on my discovery of it in Dublin Bay, I called Eblanensis; the examination of W. Thompson's original specimen enables me to correct this error. It is extremely common everywhere.

Bernhardus Hyndmanni.—Ballyholme, Bangor, Whitehead, and the Gobbins.

**Bernhardus levis*.—Not uncommon. Off Whitehead and Bangor.

Bernhardus Thompsoni.—Whitehead, Bangor, and the Gobbins; commoner than in Dublin.

Galathea Andrewsii.—Extremely common; this is also very common on the south-west coast, where Dr. E. Perceval Wright and Professor J. Reay Greene inform me it occurs as a littoral species. Professor Thomas Bell showed me specimens of the same species from deep water off Madeira; and M. Lucas, Paris, showed me a bottleful of specimens of the same species, captured off the coast of Algiers.

Munida Rondeletii.—Occurs not uncommonly in deep water, as Mr. G. C. Hyndman informs me.

Crangon vulgaris.—Appears as common here as in Dublin.

Crangon fasciatus.—One specimen, very beautifully coloured, occurred near the shore in Ballyholme Bay; several specimens occurred in a black sand off the Gobbins; these latter were in spawn. This species does not occur in the published Belfast list. In the Belfast Museum, however, there are several specimens included under *C. vulgaris*, and bearing the following localities in William Thompson's hand:—"Portaferry, July, 1838, W. T.; Belfast Bay, 1839, E. Getty; and Donaghadee, Dr. Drummond."

**Crangon spinosus*.—Two specimens, same locality as last; does not occur in Belfast list.

**Crangon Pattersonii* (n. s.).—Two specimens at the Gobbins. This species differs from last in the smoothness of the first to fourth rings of the abdomen; the fifth ring has a triangular central elevation at its inferior border; the sixth is plane above; the telson sulcate; the rostrum rounded and slightly concave above. I hope to describe it more fully shortly.

The specimens taken were in spawn. I can find no species, either recorded or in the collections in London or Paris, which agrees

with it. The trivial name is intended to commemorate the President of the Belfast Natural History Society, Robert Patterson.

Crangon sculptus.—Two specimens at the Gobbins. Not hitherto recorded, save by Professor Melville at Isle Arran, and by me at Bray, where it is far from uncommon.

Crangon Allmanni.—Of this species, named by me in 1856, I met several specimens at the Gobbins, on the 20th August, 1858. Subsequently to this, in the Belfast Museum Collection, I detected two specimens put up as *C. vulgaris*, and marked in W. Thompson's hand "Fortwilliam, Belfast."

Hippolyte varians.—Common.

Hippolyte Cranchii.—Bangor and Whitehead: a single specimen of each.

Hippolyte pusiola.—Bangor; Whitehead; the Gobbins: far from uncommon. Not in Belfast Catalogue.

Hippolyte Thompsonii.—Common in all the localities. The specimen in the Belfast Collection is marked "Strangford Lough."

*? *Mysis Griffithsii*.—What I take to be this species is in the collection of the Belfast Museum on a card marked as *Mysis vulgaris*, and from the neighbourhood of Belfast. Its occurrence in Ireland is unnoted in our lists. For this and other notes on the Belfast collection I am indebted to the kindness of G. C. Hyndman, who accompanied me in my examination of the stores of the Collection, and supplied much information as to the identification of particular specimens.

Crustacea Amphipoda.

In this list, in addition to my own observations, I avail myself of a list of William Thompson's collection, kindly furnished to me by C. Spence Bate, Esq. This is acknowledged by the reference W. T., S. B. Those species which have occurred in Dublin are also noted: the remarks on the species are my own.

Talitrus locusta.—Common at Groomsport, Crawfordsburn, and Carrickfergus. "Newcastle, Down" (W. T., S. B.). Dublin.

Orchestia littorea.—Common. Carrickfergus; Groomsport; Crawfordsburn; and Larne; "Strangford Lough" (W. T., S. B.). Dublin.

O. lavis.—Rare. Carrickfergus; Larne; not nearly as common as in Dublin.

O. Deshayesii (Savigny).—This species, new to Ireland, occurs not uncommonly, but very locally, near Carrickfergus. It is less active than either of the others. I met it also at Crawfordsburn. In England, Spence Bate informs me, it is rare as a southern species. I compared my specimens with that in the British Museum, and they are identical. Whether they are identical with the Egyptian species, is still open to doubt, as the type specimen has, I have been informed, been lost.

Montagua monoculoides.—Bangor; Belfast Bay (W. T., S. B.).

Lysianassa Costæ.—Bangor, one specimen; Belfast Bay (W. T., S. B.).
Bray, Kish Bank.

Lysianassa longicornis.—Portaferry (W. T., S. B.).

- Anonyx minutus*.—Cod's stomach, Belfast (W. T., S. B.).
- Ampelisca typicus*.—Belfast Bay (W. T., S. B.). Extremely common on the north scallop bed, Kish Bank, Dublin.
- Ampelisca Bellianus*.—Newcastle; Down (W. T., S. B.).
- Westwoodia caecula*.—(W. T., S. B.)? Belfast.
- Iphimedia obesa*.—By no means rare; Belfast Bay (W. T., S. B.). Dublin, Bray, common.
- Dezamine spinosa*.—Extremely common both in dredge and rock-pools; in the former particularly you generally meet ten of this Amphipod for one of any other. This species occurs in the Thompson list, but it were wasting space to detail localities. Dublin, Kish, and Sandycove, very abundant.
- Dezamine bispinosa*.—Bangor, county Down (W. T., S. B.). I have never met this species in Dublin, though I have looked carefully for it.
- Gammarus locusta*.—Common here, as everywhere. Dublin.
- Gammarus fluviatilis*.—Fresh-water streams near Carrickfergus. Very common in Dublin. Careful comparison of specimens taken by me in Waterford, Clare, Dublin, Tyrone, &c., has resulted in the conclusion that but one species of fresh-water Gammarus occurs in Ireland. The record of *Gammarus pulex*—i. e. a species with the posterior angles of the abdominal rings produced as teeth—has arisen, I believe, from W. Thompson having used this term as applied to *G. fluviatilis* of Roesel in his early correspondence. The true *Gammarus pulex* has not, I believe, been found in Ireland.
- Gammarus gracilis*.—Bangor, county Down (W. T., S. B.).
- Gammarus marinus*.—Carrickfergus, under the Castle; "Newcastle, Down" (W. T., S. B.).
- Gammarus palmatus*.—This species, new to the Irish lists, occurred to me in numbers at the bathing-place between Cultra and the railway station. It occurs under stones covered with enteromorpha and ulvæ, in a spot where a number of small sand-pools break a muddy sand-beach. I had previously met the species in 1856, near Merrion, county Dublin, in a similar locality. Spence Bate informs me it is extremely rare in England, and certainly Montague's species.
- Gammarus Othonis*.—Bangor; Belfast Bay (W. T., S. B.).
- Gammarus longimanus*.—Carrickfergus. Rare, under the Castle.
- Amphitoe rubricata*.—Bangor (W. T., S. B.).
- Amphitoe littorina*.—Newcastle; Bangor, county Down (W. T., S. B.). Howth, county Dublin, extremely common.
- Corophium longicorne*.—Clay, near ship-yard, Carrickfergus. Occurs in hundreds on the muddy shores of the tidal portions of the Dodder, county Dublin.
- Hyperia Galba*.—In thousands in Acalephæ, floating through the Bay; in many instances as many as thirty or forty specimens could be obtained from a single Acaleph; many of the specimens taken had ova attached to them.

Lestrigonus Fabricii (?).—This occurred with the last, but in fewer numbers. It is singular that in the supplement to Parry's "Voyage," this is figured as having occurred also along with the last. Can there be any intimate connexion, such as sexual, between them? I find some trifling differences between my specimens and *L. Fabricii* (Milne-Edwards), but await my friend Spence Bate's judgment on the point. I strongly suspect that Gosse has mistaken this animal for *Metoicus medusarum*, the distinction between the genera being such as to easily cause a mistake. This is doubtless the species W. Thompson failed to identify, owing to the bad condition of his specimens.

The two following species, found by me in Dublin Bay, have not hitherto occurred at Belfast:—

Iphimedia Eblanæ.—Found in *Rhizostoma Cuvieri*, Dublin Bay.

Chelura terebrans.—Extremely common in submerged timber at Kingstown and Howth.

Crustacea Isopoda.

I here note only the species actually obtained and identified; several yet await the latter process; this list is, therefore, an approximation only.

Arcturus longicornis.—Two specimens, dredged off Gobbins. North Bull, Dublin.

Idotea pelagica.—Common in all suitable localities here, as also in Dublin.

Idotea tricuspidata.—A more markedly deep-water species than the last; Whitehead; Ballyholme Bay. Dublin Bay, Dalkey Sound, very common.

Idotea emarginata.—Specimens in Belfast Museum. Very rare in Dublin, but has been taken in Dublin Bay. Coast of Wexford, Dr. E. Perceval Wright.

Limnoria terebrans.—In the piles, ship-yard, Carrickfergus, extremely abundant. Kingstown Harbour, and Howth and Malahide, very numerous. In Dublin this species is always associated with *Chelura terebrans*. I searched carefully for this latter at Carrickfergus, in company with Professor Wyville Thompson, but unsuccessfully. Professor Thompson informed me that he had never succeeded in finding *Chelura* in Belfast, although he had looked carefully for it. W. Thompson, in his "Fauna," makes the same remark.

Asellus aquaticus.—A small stream, near Carrickfergus. Dublin.

Jaera albifrons.—Carrickfergus. Dublin (?).

Spheroma serratum.—River Lagan, Belfast. River Dodder, Dublin.

Spheroma rugicauda.—Blackhead.

Nesaea bidentata.—Carrickfergus. Loughshinny; Dublin. Cork, on authority of Professor J. Reay Greene. Roundstone, W. M'Calla, q. v.

Porcellio scaber.—Common everywhere. Dublin.

Porcellio pictus.—Carrickfergus; Blackhead; Crawfordsburn. Dublin.

Porcellio lævis.—Rare; Carrickfergus. Dublin.

Oniscus murarius.—Common everywhere. Dublin.

Oniscus fossor.—Common everywhere. Dublin.

Philoscia muscorum.—Carrickfergus; Crawfordsburn. Dublin.

Philougria riparia.—Carrickfergus; Whitehead; Crawfordsburn. Dublin.

Ligia oceanica.—More local than in Dublin; rare about Carrickfergus; extremely common at Crawfordsburn.

Armadillium vulgare.—Common everywhere. Dublin.

The following species has not as yet been met in Belfast:—

Apseudes talpa.—Sandycove, county of Dublin, in sand-pools, 1857.

The strange admixture of northern and southern forms exhibited by these lists is too strongly marked to require more than a passing notice. I hope to return to the subject at some future meeting.

The President remarked on the importance of the critical study of species in various localities. He had no doubt, from his own hurried researches in the west, that many species yet remained unnoticed. As he saw that the Society to-night was honoured by the presence of Mr. Edward Waller, he hoped that that gentleman would favour the Meeting with his view on the subject-matter of the communication just read, as he believed Mr. Waller had been engaged in researches in the same district.

Mr. Edward Waller said that as the President had called on him, he would state that during the researches of the Belfast Committee, in which he had been associated with Mr. Robert Patterson, Mr. Hyndman, Professor Dickie, and others, the results obtained were confirmatory of the remarks made in the paper just read.

Of the shell *Odostomia conspicua*, previous to the Belfast specimens, but one perfect specimen had been found; the Belfast specimens were submitted to Mr. Alder, the gentleman who first named this species, and all the shells included in the list, on his authority, had been submitted to Mr. Alder and Mr. Gwyn Jeffreys for their opinion, and there could be no doubt that both South British and Lusitanian forms occurred here.

There was another set of shells on which he would make a few remarks. During the past year ten species had occurred to them dead, which they had not succeeded in obtaining living, although the dredging researches had been carried on nearly half way across the Channel, and in both shallow water and up to the depth of 110 fathoms. These species were northern species, and, owing to the difficulty of accounting for the non-occurrence of the living animals, perhaps it was safer to look on them as Pleistocene, though he must say that the shells were just as fresh as the specimens of species still living. Large Pleistocene deposits occur in the neighbourhood, but he should mention that none of these disputed species were as yet recorded as found in them. All

who have read Professor Haughton's paper on the Tides know that rapid currents prevail here, and from this it results that the bottom of the sea in the great depths is generally rocky. It may be that the Pleistocene beds formerly here have been torn up, and have formed the banks on which these shells are found. The mixture of northern and southern species here was very curious. He might mention the fact, that *Tapes aurea*, which had occurred not uncommonly to Dr. Kinahan at Carrickfergus, was extremely rare on the opposite, or Down coast. *Mastra subtruncata* there was extremely common, and two other species, which were rare at Carrickfergus—*M. stultorum* and *M. solida*.

Mr. Gilbert Sanders mentioned his having found, some years ago, one or two specimens of the *Tapes aurea* at Portmarnock. The shells were certainly not living, but appeared fresh. Pleistocene beds of them occurred in that neighbourhood.

Dr. E. Perceval Wright confirmed the peculiar distribution in the northern districts among the Actiniæ, some of which extended from Youghal, round the west coast, as far as Belfast, but were not found in the intervening eastern district.

Rev. Professor Haughton observed, that as Mr. Waller had alluded to the subject of currents, he would wish to make a few remarks. Two strong currents—a northern and a southern—meet in the Irish Channel. The strength of the northern current is such that it must offer an insurmountable bar to the passage of southern species northwards; but at the same time the very strength of the current would lead one to expect just such a sea bottom as had been described by Mr. Waller—a rocky bottom, from which all the soft deposits were torn away, except, perhaps, in a few hollows. The chalk shells found in the drifts about Dublin and other places on the east confirm this idea, these being more abundant near the edge of the sea. He saw no reason why the torn-up drift might not be carried even down as far as the Isle of Man.

DR. E. PERCEVAL WRIGHT read the following—

NOTES ON THE IRISH NUDIBRANCHIATA.

WHILE engaged for the last few years in investigating the Tunicata of Ireland, I have from time to time recorded in my note-book the several species of Nudibranchiate Mollusca that have occurred to me; and in order to call the attention of Irish naturalists to this branch of zoology, I would append a list of all that are known to me up to the present moment as frequenting our coasts. In the late W. Thompson's "Report on the Invertebrate Fauna of Ireland," there were, deducting synonyms, twenty-eight species recorded. The number in the list appended is thirty-eight, which is about one-fourth the number of the known British species; but I have very little doubt that the slightest attention paid to this attractive group would very considerably enlarge it. In a late excursion with my friend, Professor J. Reay Greene, around the south and south-west coasts of Ireland, several most interesting forms were discovered: among them I would most particularly mention *Eolis Farrani*. This

pretty *Eolis*—called after Dr. Farran, the well-known naturalist of this city—and of which but a single specimen had occurred to its discoverer (Mr. Alder), at Malahide, had been found, all along the south coast, in tolerable plenty; at Parkmore Head, near the entrance to the lovely Bay of Ventry, a spot abounding with interest to the zoologist, and classic ground to the antiquarian; and, not very far from the ruins of the ancient city of Faghan, I found numbers of this *Eolis* browsing on large meadows of the well-known Hydrozoon, *Tubularia indivisa*.

At Castlehaven, in Cork Harbour, Professor J. Beay Greene discovered a specimen of *Doris flammea*. This is one of the most brilliantly coloured of the genus. It was first, I think, discovered by Professor E. Forbes in the Ægean Sea, then it was found on the south coast of England, and is now, for the first time (if I except the "Report on the Marine Fauna of the South and West of Ireland," presented at the Leeds Meeting of the British Association) recorded as Irish.

The two *Hermæas* described in Alder and Hancock occurred very frequently on the west coast,—*Hermæa bifida*, frequenting *Griffithsia setacea*, and *H. dendritica*, *Codium tomentosum*, the leathery fronds of which latter seem often quite covered with the little slug.

It will be recollected that I by no means wish this list to be supposed to represent the state of our Fauna, feeling quite certain that many more species wait only to be recorded; and as I have been unable to get contributions to the list from any local collectors, I doubt not but that they may have discovered other species, though I am not aware that they have recorded them.

For the advantage of any of our young members who may be induced to study these creatures, I may, in conclusion, add, that Great Britain produces few better collecting grounds than Malahide Bay, and that Alder and Hancock's beautiful monograph will give them every requisite assistance.

List of Irish Species of Nudibranchiata known to me.

Elysia viridis, Cork (G. J. A.).

Eolis picta.

„ *Glottensis*.

„ *Drummondii*, Belfast (W. T.).

„ *coronata*.

„ *alba*, Malahide (A. & H.).

„ *tricolor*, Belfast (W. T.).

„ *Farrani*.

„ *carnea* (W. T.).

„ *papillosa*.

Proctonotus mucroniferus, Malahide (A. & H.).

Hermæa bifida, Belfast (G. C. H.), Cork and Kerry.

„ *dendritica*, Cork and Kerry.

Alderia modesta, Cork.

Tritonia plebeia, Cork (E. F.).

„ *Hombergi*, Dublin, a dark var., taken by Dr. Kinahan.

- Dendronotus arborescens*, Dublin.
Doto fragilis, Clew Bay (W. T.), Cork and Kerry.
 „ *coronata*, Cork and Kerry, Belfast (G. C. H.).
Doris inconspicua, Dublin Bay.
 „ *pilosa*.
 „ *repanda*, Roundstone (E. F.).
 „ *tuberculata*, very common in Dublin, and of great size.
 „ *aspera*.
 „ *bilamellata*.
 „ *muricata*, Belfast (W. T.).
 „ *Utidiana*.
 „ *flammea*, Castlehaven, Cork (J. R. G.).
 „ *coccinea*.
 „ *Johnstoni*.
Goniodoris nodosa, North, West, Dublin (W. T.), Cork (G. J. A.).
Triopa clavigera, Lahinch, county of Clare (W. T.).
Ægirus punctilucens, Cork (G. J. A.).
Polycera quadrilineata, Belfast (W. T.), Roundstone (E. F.), Dublin Bay.
 „ *Lessonii*, Dublin (A. & H.).
 „ *ocellata*, Dublin (A. & H.).
Idalia aspersa, Bray (Dr. Ball).
Ancula cristata, Dublin Bay (A. & H.).

The Honorary Secretary read the following communication, which he stated he had been requested to lay before the Society :—

ON A NEWLY DISCOVERED MOTH IN IRELAND (*NOTODONTA BICOLORA*).

BY ADAM WHITE, F. L. S.

MR. PETER BOUCHARD, of Sutton, Surrey, a collector of insects, of great ability, went, in the summer of 1858, to Ireland to collect moths and beetles. He was engaged on the 1st of July, 1858, hunting for his *prey* on Colonel Herbert's estate, about five miles from the town of Killarney, not far from the far-famed Mucruss Abbey. When beating the birch, a curious white moth, entirely new to him, fell to the ground. This he picked up, and, in a state of delight that can only be guessed at by one who is not a collector, Mr. Bouchard killed it, and set it out.

The body and wings of the moth are covered with a lovely white; brown and orange spots mark the upper wings; these two reddish-yellow marks are lined and edged here and there with black, and set off the white of the insect most charmingly. Five black dots mark the upper wing, and the little patch of hair and scales, so characteristic of moths called Prominents, outstand from the middle of the same wing. Mr. Bouchard worked the locality for more than a week, but without further success. On writing to London, he found that the species was *Notodonta bicolora*. Continental specimens of it exist in the British Museum; but up to this it has been unrepresented in the British collection. Mr. Bouchard parted with his specimen to Mr. Waring, of London.

According to M. Godard, *Notodonta bicolora* is not rare about Valenciennes. Ernest ("Papillon's D'Europe," vol. iv., p. 60, *Phalæna bicolor*, Plate cxxvi., Fig. 70) tells us that in his day this moth was discovered for the first time in 1769, in the Forest of Frankfort-on-the-Maine. Although it appears generally every year, yet it is only seen in small quantities; and in 1783, two years before the publication of his fourth volume, he could only get a caterpillar, which he has figured against a birch-leaf.

In confirmation of the truth of Bouchard's statement, that it falls very readily from the branch on which it rests, he adds:—"Elle se trouve sur les Bouleaux (*Betula alba*) d'où on la fait tomber très aisément pour peu qu'on en secoue les branches."

On this tree the moth deposits her eggs, which are hatched about the end of June or beginning of July, and it feeds on the birch. The caterpillar is a deep green, with tufts of hair proceeding from a white tubercle, which on the under side of the belly is slightly yellowish. Capieux, in the twelfth volume of "Naturforcher," published in Halle, 1778, figures the moth.

Dr. Beaumann, in Steinbach, caught a female moth, which laid eggs. The caterpillars were long-haired. He, not knowing their natural food, tried salad, but they refused to eat, and died. M. Bouchard proceeds next year to Ireland to look for the larva. Irish naturalists will welcome this noble addition to the zoology of their very rich island. It is but another proof that he who would seek for novelty in large objects has only to go to unvisited places in the proper season. It is a great pity that there are not premiums, in books, awarded for discoveries in zoology, as there used to be for new plants. Many among living zoologists amply deserve such rewards; whilst collectors like Bouchard, Foxcroft, and Turner, who live by their labours in the field, might receive in lieu of it pecuniary reward.

Mr. Birchall exhibited Continental specimens of the moth in question, and stated that it would be most desirable to have the occurrence of this species confirmed.

He had taken this opportunity to bring in and exhibit to the Meeting specimens of a moth which was lost to British lists for nearly twenty years, with the exception of a specimen, taken in the county of Dublin, by a member of this Society, James Haughton, Esq., and which had been exhibited here. He had, however, found *Hydrelia Banksiana* tolerably common this year in Killarney.

The following were declared duly elected:—

Ordinary Member:—John Goode, Esq., Dublin.

Honorary Member:—John Cocks, M. D., Plymouth.

Corresponding Member:—Henry Lawson, Esq., Cork.

Associate Member:—A. F. Gordon, Esq.

The Society adjourned to the 7th January, 1859.

FRIDAY EVENING, JANUARY 7, 1859.

HIS GRACE THE ARCHBISHOP OF DUBLIN in the Chair.

THE Minutes of the previous Meeting having been read, were signed by the Chairman.

THE REV. SAMUEL HAUGHTON, F.R.S., F.T.C.D., and Professor of Geology in the University of Dublin, read the following paper—

ON SOME FOSSIL PYRAMIDELLIDÆ FROM THE CARBONIFEROUS LIMESTONE OF CORK AND CLONMEL.

THE following fossils were placed at my disposal by Mr. Joseph Wright, of Cork, and as some of them are new forms, and others excellent specimens of rare fossils, they appeared worthy of being exhibited before this Society.

The genus *Loxonema* was formed by Professor Phillips as a provisional genus for the reception of many of the Palæozoic shells, previously named *Melania*, *Turritella*, &c.; and the genus *Macrocheilus* was suggested by the same geologist as a convenient substitute for the *Buccinum* of the older writers. Both these genera are properly placed by Woodward among the Pyramidellidæ. There is considerable difficulty in ascertaining the precise conchological affinities of the fossil shells of the older rocks, owing to the circumstance that the mouths of the shells are generally broken off or concealed by stone. It is, therefore, in many cases impossible to pronounce absolutely on the identity of a fossil with a recent genus; and the most that can be done under these circumstances is to give it the name of the genus to which it appears most closely allied, attaching at the same time a specific name, suggestive either of the locality in which it was found, or of some other genus to which it is also allied.

"*Loxonema* (Phillips, Pal. Foss., Cornwall, p. 98).—Spiral, turriculated, whorls convex, their upper edges adpressed against the next above, without spiral band, mouth oblong, attenuated above, effused below, with a sigmoidal edge to the right lip; no umbilicus, surface covered by longitudinal threads or ridges, generally arched."

This genus now includes many Palæozoic shells, formerly called *Melania*, *Turritella*, *Scalaria*, *Rissoa*, and *Terebra*.

I. "*Loxonema sulculosa* (*Melania sulculosa*), (Phil., Geol., Yorksh., Pl. xvi., Fig. 1, a)."

Some fine specimens of this species were found by Mr. Wright at the Windmill Quarry, near Cork. (Pl. xi., Figs. 1 and 1.)

II. "*Loxonema rugifera* (*Melania rugifera*, Phillips, Geol., Yorksh., Pl. xvi., Fig. 26)."

This beautiful species was found, for the first time in Ireland, by Mr. Wright, at the Windmill Quarry, near Cork. (Pl. xi., Figs. 2 and 2.)

III. "*Loxonema constricta* (*L. pulcherrima*, M'Coy, Carb. Foss., Pl. vii., Fig. 7). *Loxonema sinuosa* (Phil., Pal. Foss., Cornwall, Pl. xxxviii., Fig. 182)."

From the neighbourhood of Clonmel. It is not an unfrequent fossil in the Carboniferous Limestone of Ireland.

IV. "*Machrocheilus acutus* (Sow.).—Windmill Quarry, near Cork. (Pl. xi., Figs. 3 and 3)."

These specimens would be referred by some to *M. curvilineus*, but the truth is, that the species of this genus are very arbitrary; and it appears better for the present to consider them to belong to the well-known form *M. acutus*, to which they are evidently closely allied.

V. "*Cerithioides telescopium* (new).—Generic characters: same as those of *Cerithium*, with the exception of the mouth, which is unknown. Sp. character: Elongated, conical, whorls numerous (12), slightly convex, smooth, with a faint subcentral band; base of shell provided with five or six well-marked longitudinal concentric grooves, extending from the columella nearly to the outer border."

From the Windmill Quarry, near Cork. (Pl. x., Figs. 2, 3, 4.)

VI. "*Cerithioides* (n. sp.). Carrigtuohill, near Cork. This is a species distinct from the former, but not sufficiently well marked in the specimens I have seen to admit of description. It has a narrow band on the bottom of each whorl. It differs little from some specimens of *Turritella suturalis*; and I am of opinion that the few carboniferous species of *Turritella* which are still left in that genus should be removed into another, as they are wanting in some of the characteristics of the true *Turritellidæ*."

The provisional genus *Cerithioides* might be made to receive them, as they are certainly not either *Loxonema* or *Macrocheilus*. The quadrangular shape of their mouth is a character of no value in a Palæozoic fossil, liable to the distortion produced by pressure. I have seen the undoubted *Turritella suturalis* of the Carboniferous Limestone of Cork, with the *Melania*-shaped mouth of *Loxonema*, produced by pressure, which had, at the same time, squeezed the cross-section of the shell into an ellipse.

DESCRIPTION OF THE PLATES.

PLATE X.

Fig. 1. *Cerithium telescopium* (recent), for comparison with the fossil shells.

Figs. 2, 3, 4 (new). *Cerithioides telescopium* (Houghton). Figs. 2 and 3 show the faint subcentral band; and Fig. 4 shows the concentric basal grooves.

PLATE XI.

Figs. 1 and 1. *Loxonema sulculosa* (Phillips).

Figs. 2 and 2. *Loxonema rugifera* (Phillips). (New to Ireland.)

Figs. 3 and 3. *Macrocheilus acutus* (var.) (Phillips).

Fig. 4. A new patelliform fossil, allied to *Acoma*, found in the Windmill Quarry, near Cork.

PROFESSOR KINAHAN, M. D., F. L. S., read a Paper—

ON THE DISTRIBUTION OF THE IRISH ECHINODERMATA.

On several former occasions I have had the honour of laying before your meetings, papers on the Irish distribution of several groups of our animals. My remarks to-night are intended to be introductory to a series of those on our Echinodermata; and although, from the comparatively small degree of attention these animals have hitherto excited, they must be necessarily imperfect, yet, as a contribution to a subject of daily growing importance, viz., a correct knowledge of the actual number of species of restricted geographical distribution, they will be, I trust, considered worthy of taking up some little space in our Proceedings.

In these, as in the other lists I have already had the honour to submit, I have taken, as the basis of my observations, notes made by myself in my researches since the year 1850, at the same time availing myself of the labours of others in those districts which I have had but imperfect opportunities of examining, except in the cases of critical species, and then only have I quoted those authors whose identification may be depended on as to accuracy.

I feel the more called on to bring these lists before this, rather than any of our Dublin Societies, because your meetings have been already selected by others, on many occasions, as the medium for the publication of important contributions to the history of the group; although it must be deeply regretted that the most valuable of these communications are at present, and many only imperfectly, to be found in the columns of "Saunders' News-Letter," in the reports of the respective meetings at which they were read. The intended publication, during the present year, of the back Proceedings, in a compact form, will, however, I hope, in a great measure remedy this evil, and, therefore, further allusion to the topic here is needless.

As this communication is only intended to be introductory to future and detailed papers on the subject, I shall to-night confine myself to a few generalities on the subject of the distribution, reserving even many of these till the concluding paper; and to a general summary of the work done in Ireland, and unrecorded in our present standard of information on the subject, Forbes' "British Star-fishes," adopting the general arrangement of that work, and, for the present, also its nomenclature.

Before entering fully on these, it is but right to notice the more important of the papers communicated to this Society relative to the Echinoderms subsequent to 1841, the year of imprint of the "British Star-fishes."

These are—the many communications of that indefatigable and laborious observer, Charles Farran, M. D. Of these, the most notable are as follows:—On *Thyone Andrewsii*, a new Holothuriad: discovered by him on the coast of Waterford in January, 1851 (*vide* "Saunders' News-letter," February 15, 1852). On *Echinurus vulgaris*, April 15, 1857, from Clonsa, county of Waterford, and several valuable notes on other occasions.

The papers of the late William M'Calla on the star-fishes of the west coast, and of Belfast Bay; and Professor J. Reay Greene's paper on *Amphiura Leachii*, a new species of Ophiuridea discovered at Cork.

The following list shows in detail the species added to the Irish lists since the publication of Forbes; but probably one or two of the species are of questionable value.

- Ophiura Leachii* (Greene). Cork, 1858. Professor J. Reay Greene.
Briassus lyrifer (Forbes). South-west coast. Mr. R. M'Andrew.
Cucumaria niger (Couch). West coast. Mr. W. Todhunter.
Cucumaria inhærens (Mull). Balbriggan, county of Dublin, 1843.
 Mrs. W. J. Todhunter.
Thyone Andrewsii (Farran). Clonea, county of Waterford, Dr. C. Farran.
Thyone raphanus (Kor. & Dub.). Bantry Bay. Mr. R. M'Andrew.
Chirodota digitata (Mont.). Carrickfergus. Mr. W. Thompson.
Syrinx Harveii (Forbes). Strangford Lough. Mr. G. C. Hyndman.
Syrinx tenuicinctus (M'Coy). West coast. Professor M'Coy.
 „ *Forbesii* (M'Coy). Roundstone. Professor M'Coy.
Echiurus vulgaris (Savign.). Clonea. Dr. C. Farran.

All of these, except the first and *Thyone Andrewsii*, are recorded in Thompson's Fauna of Ireland. A specimen of *Echinus* presented to this Society by Mr. G. V. Du Noyer, and noticed in the Proceedings for 1856, almost seems to point to a species as yet undistinguished from *Echinus lividus*.

The great addition made to our knowledge among this group is to be judged rather by the positive knowledge gained as to the actual range of the several species, than by the mere number of species added to our lists; and the general conclusion thence arrived at, that most of the species recorded as of limited distribution are really distributed all round the island.

In the Irish seas the Echinodermata probably afford us fewer examples of types of geographic importance than any other group,—one exception is *Echinus lividus*, whose range at present stands thus:—Lough Ine, county of Cork, on the authority of fine specimens sent thence by Mrs. Thomas Townsend, as its furthest south-eastern point, to Tory Island, county of Donegal, on authority of Mr. G. C. Hyndman. There are not probably a dozen other species of restricted distribution. The following, however, will probably be found to be so:—*Cribella rosea*, *Goniaster Templetoni*, *Luidia fragillissima*, *Asterina gibbosa*, *Echinus Flemingii*, *Briassus lyrifer*, *Cucumaria niger*, *Cucumaria fusiformis*, and possibly also *Ophiocoma brachiata*, *Solaster endeca*, *Palmipes membranaceus*, *Psolus phantapus*, and *Cucumaria pentactes*. Of these, *Asterina gibbosa* is given by William Thompson on his own authority, as having occurred off the Dublin coast. I have often searched for it carefully, and dredged over grounds similar to those in which it has occurred to me off Plymouth, but unsuccessfully on the Dublin coast; whilst on the

western and southern coasts I have found it abundant wherever it did occur. I, therefore, suspect there is some error in the record, but, never having had an opportunity of examining the actual locality recorded—Lambay Island—I hesitate in the case of so well marked a species to assert positively that Thompson must be wrong. *Solaster endeca* is recorded by Dr. Ball as from Dublin Bay. In my dredging researches, which have not been few, I have never met it, and suspect an error here also. In the case of *Palmipes membranaceus*, also recorded as a Dublin species, on the authority of Mr. J. W. Warren, and stated to have been dredged about seven miles off the Dublin coast, recollecting that in Dundrum Bay the species swarms, it may be that his informant, in speaking of the specimen, used the notoriously loose computations common among fishermen. I have never met any one else who has seen a Dublin specimen. So little is known about the Holothuriadae and Synaptæ, that possibly at present it is better to omit dwelling on them too rigidly in this comparative examination.

The other species have occurred to myself on both sides of the island. I will notice a few of the more remarkable, premising that on the eastern coast the species occur in deep water, whilst on the western the same species are generally littoral.

Comatula rosacea, Dublin Bay, Valentia Island, Belfast. *Ophiocoma neglecta*, Dublin Bay, Ardmore, Valentia. *Ophiocoma granulata*, Dublin, Valentia, Belfast. *Uraster glacialis*, Dublin, very common, 12–30 fathoms, Kilkee, very common, littoral; Belfast, 15 fathoms. *Uraster hispidus*, Dublin Bay, Cork, Professor Greene; county of Down, William Thompson. *Asterias auranciaca*, Malahide, 1858; Ardmore, 1851; Valentia. When the subject has been fully worked up, I have little doubt that many other species will be added to this list, particularly among the soft-bodied Echinoderms.

With regard to the British species absent from the Irish lists they will be nearly all found to belong to the northern, being generally restricted in Great Britain to the northern islands; it is not probable, therefore, that many of them will ever be found as natives of Ireland. On the other hand, almost all the southern British types have occurred on the west and northern coasts of Ireland.

Dr. E. Perceval Wright was pleased to hear that a carefully prepared list of the Echinodermata inhabiting the Irish seas was now about to make its appearance. During the summer of the preceding year, he had, in conjunction with his friend, Professor J. Reay Greene, paid much attention to the distribution of these animals around the south and south-west coasts of Ireland. The results of these and other observations had already been laid before the British Association (*vide* "Proceedings," August, 1859), at their late meeting at Leeds. In the course of the ensuing season they hoped, if possible, to follow up and extend these inquiries. Dr. Kinahan had referred to the Spoonworm, which he seemed to regard as a member of the class Echinodermata, the animal in question belonging to the group usually denominated Sipunculoidea. In this

view of the affinities of the last-mentioned order, he (Dr. Wright) was not disposed to concur, since he saw no reason to dissent from the views of De Quatrefages and others, who proposed to remove these animals from the Echinoderms, properly so called. He did not consider it necessary to occupy the time of the meeting with detailing the various facts brought to light by Professor J. Reay Greene and himself, during their recent tour round the coast, since a summary of these would, ere long, be published in the Reports of the British Association; but he would wish to record the occurrence of the Purple Sea Urchin (*Echinus lividus*), in the Cape Clear district, which must now be considered as a well-established southern habitat for this remarkable species.

Dr. Kinahan was perfectly aware that the opinions adverted to were held by several leading zoologists, but he by no means considered the arguments brought forward on the subject as conclusive or satisfactory, and should, therefore, include both the Holothuridea and Sipunculoidea in the proposed lists, the rather as so little authentic had been published on the matter, owing to the difficulty of procuring information, and the general consequent apathy of naturalists concerning the group.

Professor J. Reay Greene briefly commented on the question referred to by his friend, Dr. Wright, a question of high anatomical and physiological import. It amounted, in short, to this—Is the water vascular apparatus which the Gephyrea possess strictly identical with the ambulacral system of the true Echinodermata? For his own part, he could not but coincide with the opinion of De Quatrefages and Huxley on the subject. With regard to the Holothuriadae, he thought it advisable that they should be altogether omitted in the list to which Professor Kinahan had alluded, since he (Professor Greene) was of opinion that the genera and species of Holothuridea inhabiting the British seas had not yet been determined with sufficient accuracy. He would not detain those present with the views which he entertained as to the true mode of subdividing the remaining orders belonging to the same extensive division. These he hoped, eventually, to bring forward in a matured form. In reference to the distribution of these animals, he would observe that, with the exception of the north-west district, there was no part of the Irish coast which had not been carefully examined by either himself or Dr. Wright.

The President declared the following duly elected as ordinary Members :—

Dominick John Corrigan, M. D., M. R. I. A., Dublin; P. L. Peacocke, Esq., Dublin.

The meeting then adjourned till the first Friday in February.

FRIDAY EVENING, FEBRUARY 4, 1859.

WILLIAM ANDREWS, M. R. I. A., President, in the Chair.

THE previous Minutes were read and signed.

The President exhibited specimens of the sepiostaire of *Sepia vulgaris*, from the west coast of Ireland, and made some general remarks on the peculiarity of the Fauna of the district, enumerating the various species which had been met there, and were either unknown or rare on the rest of the Irish coast.

Professor J. R. KINAHAN, F. L. S., read a communication—

ON THE TRACINGS FORMED ON RECENT ROCK SURFACES BY PATELLA
VULGARIS AND OTHER MOLLUSCS.

SOME time since, my friend, Mr. W. H. Baily, showed me specimens of markings of a peculiar character which had been sent to him as possibly fossil, but which he had proved to be merely surface-marking, and hence necessarily recent. The peculiar appearance presented by them rendered it a matter of interest to identify them. These were as follows:—a number of narrow, linearly rectangular, light-coloured spaces, apparently raised on a dark red ground, and arranged so as to form a series of radiating lines in one direction, or, when considered only in the transverse direction, exhibiting a series of nearly concentric curves, so that, taken as a whole, they presented a plumose appearance, closely resembling the impression of one of the plumose polypifera or polyzoa.

It was suggested by some that such was indeed their origin, and that the spaces represented the points on which the cells of *Lepralia*, or some allied polyzoon, had been developed, and from which they had subsequently disappeared. This conjecture, although an ingenious one, was unsatisfactory to me, for the following reasons:—First, there is no native polyzoon known which would accurately agree with these marks; next, the total absence of any trace of coenœcium in the specimens, for it seemed highly improbable that, in a surface comprising several square yards, all trace of the animal, if any had ever existed there, should have disappeared; next, the cells of the coenœcium, being continuous one with the other, ought to leave markings also accurately continuous in one sheet, whereas the rectangular spaces were all, or nearly all, absolutely distinct, and the surface of the stone between them generally intact; and lastly, on subjecting the specimen to a simple test, which I have found invaluable in enabling me to distinguish between mere surface-markings and obscure fossil traces, viz., the placing the stone gently and without agitation in a basin containing a couple of inches of clear water, and, after allowing it time to remain for a short time soaking, viewing it through the water under a strong sun-light, I found that the markings totally changed their characters, and presented appearances which were incompatible with their supposed polyzoon origin. Under the action of the water, the markings were seen to be

excavations distinct one from the other, with sharp-cut edges, and evidently but recently formed by cutting, and not due to the mere growing up of any organism to the edges of a system of cells. These excavations were cut out of a brown substance, which swelled up on the application of the water, and under a high power of the microscope resolved itself into filaments of oscillatoria or some allied alga.

The same objections, especially the first quoted, applied to another opinion, and one which at first sight seemed not improbable, viz., that the markings might be sun-pictures on the slate rocks of zoophytes, or algæ.

Mr. Du Noyer suggested the idea that they were in some way connected with the tracings formed by molluscs in the act of feeding. To this opinion there appeared only one objection, viz., the plumose characters of the markings exhibited; the ordinary track of a molluscan tongue being either perpendicular to the transverse plane of the animal's body, or else a long winding track; sometimes, it is true, a series of curves, but these curves disjointed from one another, and in no degree plumose.

Some tracings of *Patella vulgaris*, which I obtained at Lough Shinny, have, however, explained the whole matter. In these we see the ordinary perpendicular markings gradually passing into a zigzag line, and then into a series of connected but separate curves, which gradually approximate one to the other, till at length at the extremity of the animal's feeding ground they overlap and form a series of plumose tracings precisely similar to the markings on the specimens of slate rock communicated to me by Mr. W. H. Baily.

I have been induced to bring this before your Society on account of the great mischief which, it appears to me, the general apathy of zoologists on such subjects has caused in the rational study of zoology, such things as tracks being generally considered too insignificant to engage the attention of the student, whilst in truth many palæontological puzzles might have much light thrown on them if zoologists did their duty in living ichnology. I have been so much impressed by this, that for some time past I have been making a series of observations on this point, and have arrived at some very curious results; and although several of these have been anticipated within the past few months by the interesting observations of Mr. Albany Hancock in the "Annals of Natural History," yet there remains still a great deal to be done in this field, especially as regards the tracks of the star-fishes, the tubicolous and wandering worms, and the bivalve molluscs, all of which, I find, make most peculiar and interesting traces.

It is indeed a just cause of reproach to naturalists studying living forms, that, when appealed to by the palæontologist as to the probable origin of animal traces met fossilized, in ninety-nine cases out of a hundred no definite information can be given, because, forsooth, animal traces are too trivial a subject to devote time to; although these traces, if properly studied, afford much and valuable information as to animals' habits, and the conditions under which the animals lived and died.

There is another reason for a study of these traces. Often, as in this case, they assume pseudomorphic forms, and the zoologist is called on to pronounce as to whether the appearances are fossilized organisms or mere tracks. Now, in many doubtful cases, if the naturalist, instead of merely stating that the fossils submitted to him were not organisms, could state positively what traces they probably were, the value of his evidence would be much increased.

I cannot conclude, therefore, without expressing a hope that the time is not far distant when ichnology will just as naturally take its place as a branch of study as osteology or any other of the particular branches of the general science of zoology; for, although the evidence deduced from this source can never be as generally particular and positive as that furnished by some of the other branches—the study of structure, for instance—yet, if thoroughly and properly studied, it will be found that rules of identification do prevail, even among seemingly irregular tracks, of so unerring a nature, that the observer can from them deduce many of the characters of the nature of the surfaces, &c., on which they were formed, the influences to which these surfaces were subjected, and the nature and habits of the animals to whose labours the tracks are due—subjects now of paramount importance, owing to the growing conviction of the truth of the axiom, that fossil animal forms were formed on the same general types as living ones, lived under similar conditions, and possessed the same or similar habits.

Since writing the above, I find that *Purpura lapillus* and *Littorina rudis*, &c., make tracks which are nearly undistinguishable from those of *Patella vulgaris*.

Specimens of the tracings alluded to accompanied the paper.

After due ballot the following were declared duly elected:—

Benjamin G. M'Dowel, M. D., M. R. I. A., Professor of Anatomy, Trinity College, as Ordinary Member.

Robert Gage, Esq., Rathlin Island, as Corresponding Member.

FRIDAY EVENING, MARCH 4, 1859.

WILLIAM ANDREWS, M. R. I. A., President, in the Chair.

THE previous Minutes having been read, were signed.

The President read a paper on the habits of the British species of *Hymenophyllum*. (For this paper see end of April Meeting.)

The HONORARY SECRETARY read, in the author's absence, the following paper—

ON THE REMARKABLE DESTRUCTION CAUSED AMONG BIRDS IN KERRY BY THE WINTER OF 1854-55. BY GEORGE HENRY KINAHAN, G. S. I., CORRESPONDING MEMBER, DUBLIN NATURAL HISTORY SOCIETY.

DURING the year 1855 I was stationed on the west coast of Cork and Kerry, at which time the following notes of the effects of the severe

frost of that year, as seen in the destruction of many of our birds, were made; and as they may be of interest to some of your Members, I venture to lay them before your Society. This frost began the second week in January, and continued for four weeks. It was succeeded by a heavy fall of snow, accompanied by frost. This lasted up to about March 10th. After the frost and snow had disappeared, the dead bodies of the following birds might be met, in greater or lesser numbers, lying scattered about:—

Water ouzel (*C. aquaticus*): in numbers.

Song thrush (*M. musica*); blackbird (*M. vulgaris*); redwing (*M. iliaca*); fieldfare (*M. pilaris*): in great numbers.

Hedge-sparrow (*A. modularis*); robin (*E. rubecula*); stonechat (*S. rubicola*): in numbers.

Tits (*Parus*); either two or three species; I forgot to note the particular species: in numbers.

Titlark (*A. pratensis*); skylark (*A. arvensis*); common bunting or bush lark (*E. miliaria*); yellowhammer (*E. citrinella*); black-headed bunting (*E. schenicius*); chaffinch (*F. caelebs*); common sparrow (*Passer domesticus*), rare in district; greenfinch (*C. chloris*); goldfinch (*C. elegans*); common linnet (*L. cannabina*); lesser redpole (*L. minor*); mountain linnet (*L. flavirostris*); starling (*S. vulgaris*): in great numbers.

Chough (*F. graculus*); raven (*C. cornix*); Royston crow (*O. corax*); jackdaw (*C. monedula*); rook (*C. frugilegus*); magpie (*P. melanoleuca*): a few only.

Red grouse (*T. scoticus*); partridge (*P. cinerea*): in numbers.

Golden plover (*C. pluvialis*): a few.

Sandlark (*Tringa variabilis*): a few.

Lapwing (*Vanellus cristatus*); in great numbers.

Curlew (*N. arquata*): a few.

Whimbrel (*N. phaeopus*): a few.

Godwit (*Limosa rufa*)? I am not quite sure of the species; both may have occurred: a few.

Snipe (*S. gallinago*); jack-snipe (*S. gallinula*): nearly exterminated.

Wild duck (*A. boschas*): a few.

Widgeon (*M. penelope*): a few.

Gulls (*Larus*); either three or four species: a few.

I have omitted in the above list one or two species which I met dead, but which I had not means of identifying. Some of these had seldom or ever been seen in the neighbourhood before.

After the frost had lasted three weeks, the birds could be knocked down with a stick, they had become so tame and listless. Small boys and women might be seen hawking snipe about at a penny a dozen, but as the birds were mere feathers and bone, they were not worth even that. In the street of Castletown Berehaven I myself have seen them caught. In Cahirciveen the starlings came down the chimneys at night, and

could be caught by the dozen in the morning. Lapwing suffered more than the other plover. All the crows escaped the general destruction in a great measure, and were usually in good condition, as they feasted sumptuously on the dead and dying small birds. Curlew and duck managed to live very well, as their feeding-places between high and low water-mark were never frozen, but many seem to have been killed by the frost at night in their roosting-places.

Woodcocks, strange to say, did not seem to suffer by the cold, though thousands perished by the hand of man. They were very numerous, and in first-rate condition, but were easily shot and destroyed, coming into places where a "cock," in the recollection of the oldest inhabitant, had never before been seen. In the town of Cahirciveen a boy used to kill three or four of them every day. He lived in the house next to the hotel; in his garden there was a stream; into this he used to put a freshly cut furze-bush; under this the cock used to pitch, which he generally managed to knock down with a stick. I may also mention that hares perished in great numbers by the cold and the natives.

The following year (1856) game of every kind, especially snipe, were extremely scarce (of the latter scarcely any, except the gray or home-bred birds, being to be seen); also all kinds of small birds, black-birds, thrushes; migratory thrushes were scarcely to be seen at all. The gulls and curlews (of the sea birds) seemed to be nearly as plentiful as in former years. The only cock that I met with that year were the small variety, or "Yankees," and they did not appear in the neighbourhood of Cahirciveen till February. Even this year (1859) the game have not recovered the destruction of that year, every sportsman complaining of the scarcity; though in the county of Clare I have remarked more cock (the large variety) than I have seen since the year of the frost.

Mr. Robert J. Montgomery stated that from observations made by him that year in the county of Louth, he could fully bear out the fact of the extraordinary destruction which had occurred among birds. Many species had not recovered from it yet. All the species recorded in Mr. Kinahan's list had also been found dead in Louth. The most abundant were redwings, fieldfares, skylarks, golden plover, and green plover. Wild swans, owing to the severity of the season, were more numerous that year than he ever recollected them. The various species of Anatidæ, &c., were also very numerous, as several species were found on the Boyne which he had never met there previously. He had that winter shot there no less than seventeen species, a very large proportion for so restricted a locality. The following was the list:—mallard, gadwall, pintail, shoveller, widgeon, teal, tufted duck, golden eye, pochard, scaup, shield-duck, common scoter, velvet scoter, goosander, merganser, smew, and the long-tailed duck.

Mr. Robert Warren stated that on the north-west coast at Killala the destruction had been very great among aquatic birds. The common curlew was the commonest found dead. He remarked also that the mallard suffered much more than the widgeon or other ducks.

Rev. Professor Haughton, F.T.C.D., laid before the Society a valuable communication from Mr. Joseph Wright of Cork. It was a list of carboniferous fossils, the great majority of which had been obtained near that city; a few, however, were from Clonmel and Castleconnell, in the counties of Tipperary and Clare, and one species was from Kildare. This list was only the first of a series which Mr. Wright had promised to favour the Society with, and was peculiarly useful, as the localities and species were accurately and minutely given. Some of the species recorded were of extreme interest, and had been already brought under the notice of the Society at their January meeting, as either new to our Irish lists or altogether new to science. He might call attention to the most remarkable: *Orthoceras (Actinoceras) giganteum*; Mr. Wright's specimen is a remarkably fine one; *Loxonema rugifera*, and *Lox. sulculosa*; see remarks on these species in January last; *Platyschisma cirroides*; and *Acroculia canaliculata*.

LIST OF CARBONIFEROUS FOSSILS FOUND IN THE COUNTY OF CORK, ETC., BY
JOSEPH WRIGHT.

Cephalopoda tetrabranchiata.

Nautilus dorsalis, Little Island, Cork.

Discites, planotergatus, Windmill Quarry, Little Island.

„ *sulcatus*, do. do.

„ *compressus* (*Ellipsolites compressus*, of Low) Little Island.

„ *mutabilis*, Windmill Quarry.

Temnocheilus biangulatus, Clonmel, Co. Tipperary; Middleton, Co. Cork.

„ *multicarinatus*, Blackrock; Windmill Quarry, Co. Cork; Clonmel.

„ *globatus*, Blackrock, Windmill Quarry; Middleton, Co. Cork; Clonmel.

Orthoceras cinctum, Blackrock, Little Island, Windmill Quarry.

„ *cylindraceum*, Windmill Quarry.

„ *striatum*, Little Island.

Actinoceras giganteum, Little Island, Clonmel.

I got two specimens of this species from the little island; diameter of aperture nearly nine inches.

Poterioceras fusiforme (*Gomphoceras Sby.*), Middleton, Clonmel.

Cyrtoceras dentaloideum, Windmill Quarry.

Campyloceras unguis, do.

Goniatites Listeri, Blackrock.

„ *funatus*, Middleton.

„ *obtusus*, Little Island, Blackrock, Middleton, Clonmel.

„ *distans*, Windmill Quarry.

„ *laterale*, Windmill, Little Island, Clonmel.

Gasteropoda Prosobranchiata.

Naticopsis elliptica, Windmill Quarry.

„ *plicistria*, Clonmel, Middleton, Blackrock, Little Island.

„ *Phillipsii*, Little Island, Clonmel.

„ *spirata*, Windmill Quarry.

- Loxonema constricta*, Windmill, Clonmel.
 „ *Hennahiana*, Windmill Quarry.
 „ *impedens*, Little Island, Clonmel.
 „ *rugifera*, Windmill Quarry.
 „ *sulcatula*, do.
 „ *sulculosa*, do.
Turritella suturalis, Clonmel.
Macrocheilus acutus, Windmill Quarry.
 „ *curvilineus*, do.
 „ *imbricatus*, do.
 „ *rectilineus*, Little Island.
 „ *brevis*, Windmill Quarry.
Turbo tiara (?), Windmill Quarry.
Euomphalus acutus, do.
 „ *neglectus*, do.
 „ *pugilis*, do.
 „ *calyx*, Little Island, Clonmel.
 „ *catillus*, Middleton.
 „ *pentangulatus*, Carrigtuohill, Clonmel, Castleconnell.
 „ *rotundatus*, Clonmel.
 „ *serpens*, Little Island, Blackrock.
Platychisma cirrhoides, Windmill.
 „ *zonites*, do.
 „ *helicoides*, do. Clonmel.
Pleurotomaria altavittata, Windmill.
 „ *conica*, do.
 „ *decussata*, do.
 „ *naticoides*, do.
 „ *multicarinata*, do.
 „ *tornatilis*, Windmill, Castlepark.
Murchisonia quadricarinata, Windmill.
Acroculia canaliculata, Clonmel.
 „ *triloba*, Little Island, Carrigtuohill, Clonmel.
 „ *tubifer*, Little Island.
 „ *vetusta*, Windmill Quarry, Blackrock.
Patella mucronata, Little Island.
 „ *sinuosa*, Windmill Quarry.

Gasteropoda, Nucleobranchiata.

- Porcellia puzosi*, Windmill Quarry.
Bellerophon apertus, Little Island.
 „ *tangentialis*, Windmill Quarry.
 „ *hiulcus*, Clonmel.
Ecculiomphalus serpula, Kildare.

After due ballot, the following gentleman was declared duly elected as Ordinary Member :—

Mathew Darcy, Esq., Raheny, Co. Dublin.

The Meeting then adjourned to the month of April.

FRIDAY EVENING, APRIL 1, 1859.

WILLIAM ANDREWS, Esq., M. R. I. A., President, in the Chair.

The previous Minutes having been confirmed, were signed.

The Honorary Secretary presented, on behalf of Mr. F. J. Foot, Geological Survey of Ireland, Corresponding Member, a specimen of the lesser horse-shoe bat (*Rhinolophus hipposideros*), captured at Ennis, county of Clare. No published record of this species as Irish is to be found in the authorities.

Rev. Professor Galbraith, F. T. C. D., moved, Professor Kinahan seconded, and it was resolved unanimously:—

“That the special thanks of the Society be given to Mr. Frederick J. Foot for his valuable donation to the Society’s Museum.”

In the absence of the author, the HONORARY SECRETARY read the following—

DESCRIPTION OF BALLIALLIA CAVE, ENNIS, WITH ACCOUNT OF THE DISCOVERY THERE OF THE LESSER HORSE-SHOE BAT. BY FREDERICK J. FOOT, G.S.I.

My friend, Dr. Kinahan, having told me that about six years ago he had been informed of the existence of a cave in the neighbourhood of Ennis, county of Clare, which was a favourite resort of bats, requesting me, in my examination of that district, to be on the look-out for it,—I met with a cave in Balliallia demesne, at a distance of about two miles and a half north of the town of Ennis, which I think must be that alluded to.

This cave penetrates nearly twenty yards in a westerly direction, through strata of limestone, which dip to the east at an angle of five or ten degrees. The entrance is through a hole in the ground four feet square, on the slope of a hill facing the east. I have enclosed a rough plan and section to show the form and dimensions of the interior, which is divided into three compartments. Descending a few feet, we reach the doorway, which is four feet wide by three feet six inches in height; its sides built of dry masonry, and a large flag of limestone for the lintel. Passing through it, we stand, or rather stoop, in the first compartment, which is eight feet long, five high, averages five feet in width, and contracts at its further end to an aperture two feet wide, by which the second compartment is entered.

We now take leave of the daylight, and, lighting a candle, perceive that we are in a chamber twenty-two feet in length, ten in width, and nine feet in height. Evidences of human occupation of the cave are also seen here, as there is a bench of rough stonework, two feet high, at each side, probably erected by distillers of illicit whiskey, as report says that formerly this cave was one of their places of resort. The ceiling presents a varied appearance, being in some places rough with projecting points, which form nooks and crannies; while in others the flat under-surface of the beds of rock appear fretted with incipient

stalactites. I call them incipient, as they do not attain to any length, but form a kind of bead-work arranged in polygons. From this, through an opening one foot six inches wide, we creep into the third compartment. It may be described as a rugged cell, twenty-four feet in length, varying from two to four in width, and averaging four in height.

The cave is quite destitute of vegetable life. Its sole inhabitants seem to be the lesser horseshoe bat (*Rhinolophus hipposideros*), the apple sphinx moth, and a large blackish spider. Of both of these, some dozens occurred. I shall confine my further remarks to what I observed respecting the bats.

The favourite haunts of these are dry vertical nooks in the rock, from the top of which they hang suspended by their claws, head downwards, and completely enveloped in their wings; so much so that not even their ears are visible. They sometimes, but not often, suspend themselves from the flat under surface of the rock. Two are rarely seen near each other, and never more than one in the same nook. In selecting a position to hang themselves, they appear to be regardless of its distance from the ground, as they may be seen at different heights. On the candle being held near them, they wince slightly from the light, changing their vertical position into a curve. They are easily captured, making no resistance beyond a faint squeak or clicking noise.

I met only the one species; and it is a singular fact that in three visits I made to the cave, all I saw were males. On my first visit I saw four in the innermost, and two in the middle compartment; they were all in nooks. It should be remembered that the inner compartment was tolerably dry that day. On my second visit, about a week afterwards, this compartment was deserted, whereas I captured five in the middle one. The inner cave at this visit was dripping with water, there having been a good deal of rain in the interval, which soaked through the joints of the rock. The third time I went I remarked one bat in the first compartment, near the entrance, in broad daylight. In the middle chamber there were two, not in crevices, but suspended from a flat surface near the ground. In the innermost there were three. This day the cave was rather wet. From what I had hitherto observed, I consider it remarkable finding one near the entrance, and in daylight. They appear generally to like total darkness, but a dry retreat is evidently their chief desideratum, so that they prefer daylight to damp darkness.

There are several caves in the neighbourhood of Quinn (about five miles east of Ennis), which I have examined, in hopes of finding other species. Any of these caves which had small mouths were rudely stopped up with loose stones and brambles, to prevent the foxes earthing in them (this being a hunting country). There was plenty of room, however, for the bats to enter if they chose. I removed the stoppages from two of them, and explored the interior; but although they were dry and dark, and very promising, I could not discover any bats.

In a cave near the village of Quinn, which only extends a short distance under ground, and can be all examined without a candle, I

found one (a male) of the species above described. On my first visit I captured four bats, which all died before I was able to forward them to Dublin. I could not get them to eat anything. At a subsequent visit I took five specimens, which I forwarded to Dr. Kinahan. I kept them for some days under a wire meat-cover on the ground, and on one occasion, when I carelessly lifted the cover, a bat which chanced to be on the ground raised himself without difficulty, and flew rapidly from the ground. He flew quickly and strongly, much like a swallow, and, though the room was small, he knocked against neither ceiling nor wall, although he dodged with the greatest address every effort I made to re-take him. I have been told of another much larger bat in this neighbourhood, but have not seen specimens. Since the above was written, I procured in separate caves two other specimens (one a female), in the neighbourhood of Quinn. One of these caves was stopped. From all I can find out, there is every reason to believe that the lesser horse-shoe is *the* bat of this part of the country.

Professor KINAHAN, F. L. S., read the following paper:—

MAMMALOGIA HIBERNICA: PART I.—SUB-CLASS, LISSENCEPHALA; ORDER, CHEIROPTERA, INSECTIVORIDÆ;—OR, A GENERAL REVIEW OF THE HISTORY AND DISTRIBUTION OF BATS IN IRELAND; WITH REMARKS ON MR. FOOT'S DISCOVERY IN CLARE OF THE LESSER HORSE-SHOE BAT, A SPECIES HITHERTO UNRECORDED IN IRELAND.

MR. FOOT'S paper on the discovery of the lesser horse-shoe bat at Ballyallia and elsewhere, in the county of Clare, is so complete as regards the habits of the animals, that I will incorporate my remarks on that highly interesting communication in a general review of the whole order to which it belongs; being the first of a series of papers which I have long contemplated bringing before your Society, illustrative of Irish Mammalogy.

In these I have drawn almost entirely on matter which has come under my own observation, and in every case have had the opportunity of examining critically the specimens quoted, and of comparing them with authentic specimens; and also, in all doubtful cases, have, through the kindness of the President of the Linnean Society, backed my own opinion by his, as to the identity of my specimens and the species recorded in the "British Quadrupeds," first edition, the full value of which latter will be at once appreciated by any one who attempted to study this group some eight or ten years since, when, out of all the public Museums in Dublin; I could only find three authentically named British species, viz., *V. Nattereri*, *Sc. pipistrellus*, and *Plecotus auritus*; so that, when I procured *V. mystacinus* for the first time, I found it utterly impossible to make sure of the species positively until after a reference to London. Now, however, the case is different, as authentically named specimens of at least eight of the British species are available to the student in our National Museum and elsewhere.

I cannot refrain from noticing the happy opportunity which Mr. Foot has enjoyed as regards his discovery, nor the equally happy use which he has made of it, pursuing his investigations in the true spirit of a naturalist, carefully noting every circumstance likely to throw light on the habits of the bats, and cautiously investigating, again and again, the accuracy of each observation, and at the same time carrying on these researches in a humane manner, avoiding that indiscriminate destruction of life which is too often, and justly, cast up as a slur and blot on the study of natural history and its investigators.

Bats, of all the mammals inhabiting our islands, afford to naturalists the fewest opportunities of examination, so that of most species the mere capture is an event; and few of those who have the good fortune to do this enjoy a chance of studying their habits, or, if they have the chance, have the courage to face the dirt and danger of underground research in the indefatigable manner the author of the paper referred to has done.

I know of no branch of mammalogy in a more unsatisfactory state than the distribution of our bats. As a general rule, every bat seen flying about is put down as the common bat, and transferred to the naturalist's note-book as the pipistrelle. This is evidently a great error. In certain parts of Clare, as we have learned to-night, the lesser horseshoe bat must be a common species. In parts of Kildare, I showed, some years ago, that Daubenton's bat was the commonest species; and it is most probable that, when research has been made and duly carried out, it will be found that other species are equally as common as the pipistrelle. Taking the average number of bats which have come under my own notice, I do not find it commoner than the long-eared bat; and none but a very practised eye could distinguish these two species on the wing, and, in the case of others, even the most practised eye must fail. I have, therefore, under these circumstances, rejected every notice which was not confirmed by actual examination of the specimens; as my object is to furnish authentic records concerning species, of whose specific characters there can be no doubt, in every case referring to some well-known standard authority, so that, should it afterwards appear that the names attached to the species by British authors are wrong, the observations may be easily referred to the proper species, and thus remain intact, as far as comparison between type species is concerned. The authority for nomenclature, &c., used in this paper has, with one exception, been Professor Bell's work on "British Quadrupeds," but the characters in every case are drawn from actual specimens. I preface my remarks on the several species with a few observations on the general history of the progress of their discovery in Ireland, and of the genus *Rhinolophus* in particular.

Until within a comparatively recent period two species only of Cheiroptera (the pipistrelle and the long-eared bat) were believed to inhabit Ireland; to which, in 1838, Daubenton's bat was added by the Ordnance Survey collectors, a single specimen having been taken in Londonderry. As this was identified by the Rev. Mr. Jenyns, there

can be no doubt of the correctness of the record, although the specimen itself has been since lost.

In a paper read by our present President, William Andrews, Esq., in December, 1842, the following passage occurs, which I quote from "Saunders' News-Letter." The paper is entitled, "The capabilities and advantages that Ireland offers to the Naturalist." Mr. Andrews, speaking of the Cheiroptera, states:—"Of the several genera, thirteen species have been noticed in England, while but three are as yet recorded in Ireland, and but little is known of their habits. One, of large size and strong flight, has been observed in the neighbourhood of Dingle. It is possibly the *Nectule*, the largest of British species, except *V. myotis* (*murinus*). The long-eared bat and the pipistrelle are frequent. Doctor Scouler has in his possession a bat apparently undescribed. It was captured near Dublin by Francis Whitla, Esq. It is smaller in size than *Plecotus auritus*, of a reddish colour, and is remarkable in having a single long hair depending from the sternum."—"Saunders' News-Letter," December, 1842.) I regret I have been unable to trace the last of these specimens. It was in Mr. Whitla's possession up to a short time before his death. Of the other species mentioned I have more to say anon.

In 1845 Mr. G. Mangan captured a specimen of Natterer's bat at the Scalp, counties of Wicklow and Dublin. Professor M'Coy read a paper on its occurrence, February 12, 1845, giving full details of the specimen which at present exists in our Museum. From the report of this paper the following is quoted:—

"My friend, Mr. J. Hone, has recently mentioned to me the occurrence of a bat to a friend of his in Westmeath, which, from the accurate description of the curious leaf-like skin to the nose, must have belonged to the genus *Rhinolophus*, or the horse-shoe bats—a genus not as yet recorded in Ireland. From the size mentioned, it was most probably the greater horse-shoe; but as the specimen was gone to decay before its value was known, the matter must remain unsettled."

Mr. J. Hone said the bat had been described to him as having a large-pointed appendage on its nose, which, with its great size, were so remarkable that they were noticed at once by those who had seen it in his friend's office, where it was fastened up till it fell to pieces.—("Saunders' News-letter," February 12, 1845.)

In 1852, I myself procured a specimen of the whiskered bat, *V. mystacinus*, at Feakle, county of Clare, which I presented to the Society, in whose Proceedings, owing to a misapprehension of my remarks at the time, it was positively recorded as *V. Daubentonii*, although my statement was that I thought it more nearly approached *V. mystacinus* then unknown as Irish.

In 1853, I was fortunate enough, in company with and through the information of Frederick Haughton, Esq., to capture a number of specimens of *V. Daubentonii*, from a large colony of these animals at Tankardstown Bridge, county of Kildare. At the time, through lack of

information, and not giving sufficient weight to the characters of the interfemoral bands, I mistook the species for *V. Nattereri*, and as such recorded it in our Proceedings, and in the "Zoologist." This error was cleared up, some few months subsequently, by a visit to the British Museum, and also by a communication from Professor Bell, to whom I had forwarded specimens a short time subsequent to my discovery.

I quote Professor Bell's letter, lest any doubt should at any future time arise as to the identity of *V. mystacinus*, which at present remains unique, and is in a very bad condition.

"The Weeks, Selborne, May 1, 1853.

"MY DEAR SIR,—I return the bats, for the loan of which I am much obliged, and am really sorry to have kept them so long from you. I have examined them with great care, and am satisfied in my own mind that the *three* (Kildare specimens) are *V. Daubentonii*, and the single one (Clare specimen) *V. mystacinus*. The former cannot be mistaken for *V. Nattereri*, as the latter has only eight lines in the interfemoral. I have taken it in this place amongst the rafters of a house which I pulled down. *V. Nattereri* is also of a lighter colour.

"Believe me, dear Sir, yours truly,

"THOMAS BELL."

The lesser horse-shoe bat, *Rh. hipposideros* (*Gmelin*) is this evening for the first time recorded in Ireland, so that at the present time six Irish species are positively known, exactly double those known in 1838; and it must be a subject of congratulation to your Society that all the additions have first been made public through the medium of your meetings, and that specimens of all the species are in your collection.

The pigmy bat has also occurred near Dublin, but this is generally now looked on as the young of the pipistrelle.

As far back as 1845, as has been already seen, Professor M'Coy recorded the occurrence of a *Rhinolophus* in Ireland. I should also mention that, last Christmas, Professor William King, of Queen's College, Galway, mentioned incidentally to me that he had captured a horse-shoe bat in Galway the previous June. After I had identified Mr. Foot's specimens, I wrote to Professor King, asking him whether my memory served me right as to his conversation with me. In his reply he mentioned that he had promised to make his discovery the subject of a communication elsewhere.* I therefore notice it here, though unpublished, to secure to him priority of discovery should his specimen prove the same species as Mr. Foot's, now recorded. No other record of the genus in Ireland, as far as I can learn, has ever been published.

* This he has since done. *Vide* "Proceedings of the Dublin University Zoological and Botanical Association" for June, 1859.

The species has been satisfactorily identified, as I forwarded to Professor Bell some of the specimens of the horse-shoe bat, taken by Mr. Foot; the following is his reply:—

“*New Broad-street, London, March 23, 1859.*

“MY DEAR SIR,—I did not get your pretty little bat until this morning. It is clearly *Rh. hipposideros*. You mention in your note the existence of the transverse lines on the ears, but this is quite a different character from the rugæ which exist in *Rh. ferrum-equinum*, and which appear as if the ears had been folded or plaited, and then flattened again. There is no doubt of the essential distinction of the species.

“Faithfully yours,

“THOMAS BELL.”

With regard to the latter part of it, I may remark, that the rugæ alluded to have totally disappeared in the dry specimens of *Rh. hipposideros*.

The Clare specimens were also, through the kindness of the Director of our National Museum, Dr. Alexander Carte, carefully compared by me with a fine specimen of the greater horse-shoe bat brought from the Crimea by Assistant-Surgeon Carte, late 4th Dragoons, and by him presented to the Museum. By means of this examination, I was enabled to draw up the comparison of the two species given below. The specimens were also carefully compared with the figures in the “*Fauna Italica*” of Bonaparte, Bell’s “*British Quadrupeds*,” &c., so that no doubt could remain as to their identity with the *Rh. hipposideros* of English authorities.

Synopsis of Irish Species.

[The descriptions drawn from actual specimens. The dimensions are in inches and tenths.]

LISSENCEPHALA—CHEIROPTERA—INSECTIVORIDÆ.

Family—RHINOLPHINÆ (E. Gray).

Nose disk expanded into a leaf behind; nostrils separated by a pit or process; tragus absent.

Genus—Rhinolophus.

Lesser Horse-shoe Bat, *Rh. hipposideros*, (Gm.), *Rh. biastatus*, (Geoffr., Desmarest, &c.)

Dentition: in. $\frac{2}{4}$; can. $\frac{2}{4}$; molars, $\frac{1}{2}\frac{5}{8}$; tot. $1\frac{1}{8}$.

Nasal membrane double. Posterior, lanceolate, without basal lateral expansion, densely hairy. Anterior dilated, sinuated at its margin, covering entire nose. Ears distinctly notched externally at base, and slightly notched at apex; obsolete plicate, plications disappearing when dry. Fur, very long, soft, and silky; back, grayish brown; roots of hair white, under parts light grayish, almost-white, slightly darker at sides.

DIMENSIONS.

	Inches.
Length of head and body,	2·125
„ head,	0·625
„ tail,	0·8
„ ears,	0·75
Spread of wings,	9·0

Additional Measurements.—Humerus, 0·6 inch; cubitus, 1·5 inch; pollex, 0·3; second finger, 1·0; third finger, 2·2; fourth finger, 1·8 fifth finger, 1·6; leg, to end of claws, 1·5; breadth of ear beneath, 0·345; spur or hallux, 0·5.

The only female I examined was slightly larger than the males.

The interfemoral ends at the ankle, leaving the whole foot free; it is slightly hairy on its upper half, and somewhat quadrilateral; interfemoral bands very numerous (18–20). Feet slender, the claws moderately long, covered with long white hairs; whiskers weak and scattered.

Habitat: Dark, dry caves.

Localities: Ballyallia caves, Ennis, county of Clare; caves near Quinn, county of Clare, where the species was discovered by F. J. Foot, Esq., March, 1859; Galway, a single specimen, identified by Professor William King, Queen's College, Galway, by whom it was captured in a drawing-room, June, 1858.

The specimens sent me by Mr. Foot lived for some time in confinement; they seemed in a semi-torpid state, were gentle in their manners; those which ate with me took both insects and raw meat, and lapped milk; they were all, with one exception, males; their habits may be gathered from Mr. Foot's communication; their cry is feebler than that of the pipistrelle. I append extracts from Mr. Foot's correspondence, bearing on their habits:—

“ *March 10, 1859.*

“ *MY DEAR KINAHAN,*—I found out the cave near this, about which you asked me when I was in town; I got four bats in it; it is very curious to see how they hang suspended by their two legs from the *ceiling* of the cave. There were plenty of them, but I only brought home four, and put them in a cage, out of which I find one has effected his escape.—March 15th. I was at the cave again to-day, and got five bats; they have the horse-shoe-shaped thing on their nose, but not that in their ears.—March 16th. The bats, five in number (apparently alive and well), leave this morning. If they arrive alive, the best cage to keep them in is a meat-cover made of wire gauze; in a common cage they hurt themselves trying to squeeze out between the bars, but they cannot do this in the cover, and besides, the gauze does for them to hang by. Those I first had I put into a wire cage, the wires about half an inch apart, and two of them actually got through and escaped. The two which remained died hanging to the cross wires, the ends of their

wings clutching the upright wires, and stiffened in this graceful attitude. The bats can see well, even in the daylight; one of my five got loose in a room yesterday where there was plenty of light; hard work enough I had to catch him; every time I flapped my handkerchief, or put out my hand, he would turn and avoid me like a hare. They select the *dry* little nooks in the cave, and, when hanging, they are completely enveloped in their wings. On holding a candle near them, they would wince from the strong light.—March 20th. They do not congregate in large numbers. I could only find five the last day I was in the cave. You do not see more than one in each nook or crevice. I saw one fellow hanging from the bare ceiling, but they prefer crevices. They were all within reach of my hand.—March 22nd. Yesterday, I was in two or three caves near Quinn; they are not good ones, not dark enough for bats; any caves in that neighbourhood, with small mouths, are stopped up with loose stones and brambles. I opened one and went in, but no bats. In one cave, with a large open mouth, I got one bat; he was hanging in an exposed (but *dry*) place, and quite visible by daylight. I took him down, but finding him the same, i. e., horse-shoe lesser, I hung him up again. It is evident these bats like their retreat to be dry and dark (pitch dark if possible), but dryness is the chief point; they prefer *dry daylight* to damp darkness. I think it likely that the *Great Horse-shoe* may frequent this part of the country. A very intelligent countryman near Quinn told me, of his own accord, that there were two sorts of bats there, one a *little fellow* with a thing on his nose; the other much larger than it.—March 23rd. I was at the original cave yesterday; it is a positive fact that all the bats are males; there were six in the cave yesterday; I took them all down, examined them, and finding they were the same species, and males, hung them up again.—March 27th. I send this evening a box containing two bats which I got yesterday in two separate caves near Quinn. I think one is a female; it is larger than the others. One of the caves had been stopped, but I opened it.

“Yours, &c.

“F. J. Foot.”

There are several curious facts deducible from these observations. The choice of a *dry*, light retreat, in preference to a dark, damp one, is, as has been noted by Mr. Foot, a curious circumstance, bats being generally supposed to be dwellers only “in caves where no daylight enters,” at least when hibernating; although it is well known that some species hawk in the broad glare of the noonday sun, especially in winter, a fact of which I could quote numerous instances from my notebook, were such wanted. The hibernation of the males apart would also appear to be a settled question. All the specimens sent to me were males, except one, that alluded to in the communication of March 27th. Is this habit* of the congregation of a single sex peculiar to the hyber-

* Since the above was in the printer's hands, I visited these caves myself, and find that in the summer the bats desert them, as I could not find any. A person in the neigh-

nating season, or does it occur at all seasons? Bell states it occurs among the female *Pipistrelles*. The absence of other species in these caves is also worth noting.

Mr. Foot's observations on the bat's power of rising from a plane surface corroborates Bell's remarks, that this power is probably common to all bats. Bell records it of *V. Nattereri*, the *Pipistrelle*, and *Plecotus auritus*; and I can vouch for it myself in *V. Daubentonii*, and this species. The habits of this bat seemed otherwise, to me, sluggish, but probably the specimens were half torpid when they reached me.

The figures of the species given in the "*Fauna Italica*" leave little to be desired as far as the species is concerned; but it is a pity the details of the nose-leaf are not more clearly given, as this affords one of the best characters for distinguishing this species from the Greater Horse-shoe. The following is a comparative statement of the differences between my Clare specimens, and a Crimean specimen of the Great Horse-shoe bat captured on a sentry's bayonet at Balaklava. The most striking difference is size, the Greater Horse-shoe being nearly double the size of the Lesser. The spread of wing of each is as follows:—Greater Horse-shoe, 13 to 14 inches; Lesser Horse-shoe, 8 to 9 inches. The colour of the greater horse-shoe is a yellowish-red on the back, nearly white beneath. The lesser horse-shoe is a blackish gray—almost black above, nearly pure white beneath. The ears of the greater horse-shoe have but a very slight emargination at the top and base, while in the lesser horse-shoe these are both strongly marked, and the lobe at the base of the ears is much larger in proportion; both possess the transverse lines on the ear, but in the greater horse-shoe these extend over a greater extent of the ear inwards. They also remain distinct in this species when dried, while in *Rh. hipposideros* they generally disappear, and are hence absent in museum specimens. The leaf on the nose differs in the two species. In the greater horse-shoe the posterior leaf is dilated at its extremity, so that the lower extremity is heart-shaped, and the little circular pits which are situated here are very prominent. In the lesser horse-shoe the base of the posterior lobe is scarcely, if at all, dilated, so that the appendage is lanceolate, and the circular pits are scarcely to be found without some search, and are never so prominent as in the other species. On the other hand, the anterior basal portion of the leaf is proportionally more dilated in the lesser horse-shoe, covering nearly the entire of the nose. The eyes are extremely small, and so deeply sunk in the fur as not to be visible without much research. Irish specimens have been deposited in the National Museum, Kildare-street (male and female), Natural History Society, Brunswick-street, and the Belfast Natural History Society's Museum.

It is seemingly the common bat of that part of Clare where it occurs.

From its British and continental distribution it would appear to be a southern type.

bourhood told me that the bats are only found there in the winter: so that it appears this species in the summer forsakes its winter quarters.—J. R. K., August 12, 1859.

Family—VESPERTILIONIDA.

Nose simple; ears with an internal appendage; tail long, enclosed in the interfemoral membrane.

Genus—*Plecotus*.

Ears elongate, *united at base*; ears and tragus broad; nasal groove simple, lunate.

Long-eared bat (*Plecotus auritus*).

Dentition: $\frac{1}{3}$, $\frac{1}{3}$, $\frac{4-5}{5-6}$; total, $\frac{1}{3}$.

Ears, twice length of head; tail, longer than forearm.

DIMENSIONS.

Length of head and body,	1.9
„ head,	0.75
„ tail,	1.5
„ ears,	1.4
„ tragus,	0.6
„ forearm,	1.45
„ humerus,	0.75
Spread of wings,	9.0
Length of femur,	0.8 nearly.
„ tibia,	0.625
„ thumb or pollex,	0.3
„ second finger,	1.3
„ third finger,	2.37
„ fourth finger,	1.9
„ fifth finger,	1.9

Ears ovate, entire on outer margin which is strongly plicate, notched internally at base which is distinctly lobed; tragus falciform at base, beneath notched.

Fur moderately long, silky, soft, rufous above, the centre darkest; bases of hairs bluish gray; under parts pale-yellowish gray, lightest on flanks; interfemoral very sparsely hairy; glandular lines distinctly marked, numerous (11-12).

This description is taken from a specimen procured at Aughnacloy, county of Tyrone, by Edward Waller, Esq., and now in my possession.

The interfemoral bands vary in number and in correspondence on each side of the tail, being eleven on one side and twelve on the other. The length of the tail and forearm nearly correspond; but those of third finger exceed those of forearm and arm, taken together, by above 0.2 inch; the colour of the fur also answers to the descriptions of *Plecotus auritus*, and not to the descriptions of *Plec. brevimanus*, if this latter be a distinct species.

Bell's figures of the species are highly characteristic.

Habitat: The following interesting account of these bats is taken from Professor M'Coy's paper, already quoted:—"The first time I saw

this species alive, I was stopping at the Vale of Ovoca, county of Wicklow, when the church of Castlemacadam was undergoing some repairs, when one of the men came running in to me with one he had just captured, and which, from the oddity of its appearance, waving its long ears about in every direction like ram's horns, he was afraid to hold securely; so that I had scarcely got sight of it when he let it go, and away it fluttered. I, however, went at once with the man to the place, and, having ascended to the loft which intervenes between the ceiling of the church and the rafters, I beheld the most extraordinary spectacle,—hundreds of those little creatures clung in festoons to the rafters, hanging by their hindlegs, with their heads downwards, not only to the rafters, but to each other, in pendant clusters, as large as a man's hat. Being quite unprepared for finding such a multitude of specimens, I fear avarice for a moment mastered our better feelings, for we filled two or three milkpails with them.”—*Saunders' News-Letter*, Feb. 12, 1845.

In 1839, a specimen was taken out of a hole in the centre of a stone wall, in my presence, at Cloverhill, county of Dublin.

Localities: Dublin, in many localities; according to my own experience, common; Kildare, Frederick Haughton, Esq., specimen in Royal Dublin Society; Aughnacloy, Tyrone, Edward Waller, Esq., q. v.; Kerry, W. Andrews, Esq.; Youghal, Robert Ball, Esq., LL. D.; North of Ireland, William Thompson.

It would appear, therefore, to be as universally distributed in Ireland as in England.

Genus—Vespertilio.

Head round; forehead convex; face elongated; tragus generally pointed.

Dentition: false molars $\frac{3}{4}$.

Whiskered bat, *Vespertilio mystacinus* (Leisler); *V. humeralis* (Temminck).

Dentition: $\frac{4}{3}$, $\frac{2}{2}$, $\frac{5-6}{6-6}$; total, $\frac{13}{20}$.

Upper lip furnished with a moustachè of fine hairs; general colour of back blackish; tragus more than half length of ear, lanceolate pointed; interfemoral covered beneath by numerous white ciliated bands, fringed with hair.

DIMENSIONS.

	Inches.
Length of head and body,	2·0
Head,	0·75
Tail,	1·58
Ears,	0·40
Tragus,	0·2
Forearm,	1·3
Spread of wings,	8·0

The above measurement of the wings is taken in a straight line across the back; following the curvature of the wings, they measure 10·5 inches nearly. The breadth of the ear is 0·3 inch.

Ears somewhat oval, deeply notched on outer side, a fold beneath the notch, and also on inner side. The ears are bare for half their length, the remainder covered with a dark down. Tragus more than half length of ear, lanceolate, inner side straight, outer lobed at base. Fur of back reddish at the tips, the bases of the hairs black, which gives a general dark appearance to the part. Interfemoral membrane dark, almost black, covered with light hair; hairy lines numerous (16). Belly whitish, almost white. Tail long. Interfemoral membrane and wings continued up to bases of toes. A distinct moustache of soft velvety black fur, mixed with long bristles on each side, on upper lip.

Locality: Feakle, county of Clare, 1852. One specimen only obtained, which, as far as I know, is unique. It is in the collection of the Dublin Natural History Society.

The above description is drawn up from the only Irish specimen known, which was obtained by me in August, 1852, under rather peculiar circumstances, being brought to me by a domestic cat I was in the habit of taking much notice of, the cat at the time drawing my attention to her peculiarly acceptable offering by the peculiar churring noise used by those animals in calling their kittens. At the time, although the specimen was preserved, I mistook it for the common bat, and it was not till some months afterwards, when I wanted the specimen to fill a gap in the Society's Museum, that, on identifying the specimen, I perceived its value.

It was recorded by me at the June meeting of the Society, 1853, as follows:—"Mr. Kinahan also begged to present a bat obtained at Feakle, county of Clare. He referred it in much doubt to *V. Daubentonii* (although it approached very closely to a species as yet unrecorded as Irish, *V. mystacinus*), which species had been once at least captured here." At this time I had not seen a specimen of *V. mystacinus*, and perhaps acted too cautiously in referring it to a species which was a recognised inhabitant of the island, in preference to one previously unknown. At a meeting of the Society, held December 4, 1853, I again recorded my doubt as to its being *V. Daubentonii*, and, comparing it with the specimens of that bat obtained at Kildare, which I then confounded with Natterer's bat, I noticed the points which are really characteristic of the two species. I have already quoted Professor Bell's letter on the subject of this specimen.

I can give no account of its habits or habitats further than the fact that there are but few buildings in the locality where it occurred, and the trees in the neighbourhood are all young, and not covered with ivy; the hills around are covered with rocks, many of which have clefts and crannies of considerable size pervading them.

The species is extremely liable to be confounded with *V. Daubentonii*; but the lesser size, the darker colour of the back, membranes, and ears, the lighter colour of the belly, the coarser texture of the fur, the greater extent of the moustache, and the form of the tragus, enable us to distinguish between them. From *V. dasycnemus* (*V. emarginatus*) of the British Quadrupeds, it appears to be distinguished by the deep emargination of the ear in that species.

Daubenton's bat; *Vesperugo. Daubentonii* (Leisl.)Dentition: $\frac{1}{2}$, $\frac{2}{2}$, $\frac{6-6}{6-6}$; total, $\frac{13}{8}$.

Upper lip with a slight moustache; general colour, grayish red, without any tinge of black; tragus scarcely half length of ear, curved on inner margin, pointed, lanceolate; interfemoral covered beneath by ill-defined numerous hairy lines, fringed with a margin of stiffish hairs.

DIMENSIONS.

	Male. Inches.	Female. Inches.
Length of head and body, . . .	2.0	2.075
„ head,	0.6	0.6
„ tail,	1.35	1.25
„ ears,	0.6	0.6
„ tragus,	0.25	0.25
„ forearm,	1.5	
Spread of wings,	9.87	10.37

Additional Measurements.—Humerus, 1 inch nearly; cubitus, 1.5 inch; pollex, 0.25 inch; second finger, 1.6 inch; third finger, 2.4 inches; fourth finger, 2.0 inches; fifth finger, 2.0 inches; leg, to end of claw, 1.25 inch; breadth of ears beneath, 0.30 inch.

The females all exceeded the males in the spread of the wings, and were lighter-coloured beneath. These measurements are the average of those of twelve specimens.

Tragus narrow, lanceolate, same colour as ear, lobed at base externally, internal margin curved; ears lobed at base externally, and slightly notched about half-way down, upper-half naked, base clothed with a fine, close fur; back, head, shoulders, and face, dark-reddish gray, base of hairs, bluish gray; along angles of the jaws, reddish gray; belly, grayish white, roots of hair, nearly black, lightest along the median line; around the arms, white; interfemoral membrane, light, dusky; glandular bands, numerous (varying from eight to fourteen in those specimens which I examined), covered with scattered hairs, and fringed with a margin of stiffish hairs; claws robust and clumsy-looking, the most so of any of our Irish bats, ciliated with strong, white hairs; tail exerted nearly 0.1 inch; whiskers, long and stiff; moustache, soft, black, and velvety-looking, distinctly marked; a deep sulcus between nostrils; follicles well marked and prominent.

Habitat: holes in walls.

Locality: County of Londonderry, Ordnance Survey Collection; since lost; Tankardstown Bridge, county of Kildare, 1853, &c.

In 1853, Frederick Haughton, Esq., Levitstown, county of Kildare, invited me to go down to that county to examine a locality in which he had himself, some time previously, counted thirty-five bats coming out of a little hole in the buttress of a bridge. On the 22nd of June I availed myself of the invitation, and, before going down to the bridge, he gave me two specimens which he had shot the previous evening on the River Barrow, at the time remarking to me that they were lighter in colour

than the bats he was accustomed to see there; they proved to be *V. Daubentonii*. The bridge in which they resided has a set of small holes in the masonry of the abutment, situated about four feet above the ordinary level of the Barrow, but liable to be submerged by very high floods. The stones around the edges of the holes are polished by the constant running in and out of the bats. On poking a switch into the hole, the bats set up a loud clicking and chirping. In the evening, by means of a gauze butterfly net, held near the mouth of the hole, we procured several specimens of this bat, and one pipistrelle.

The bats began scrambling and fighting among themselves audibly in the hole at about 8:30 P.M., they did not begin to fly till an hour later; between 9:30 and 10:30 we counted forty-one bats coming out of the hole, but, in spite of the number abroad, the noise inside seemed just as great as ever. The following evening we counted twenty-nine coming out of the hole; the weather was harsh and cloudy, and growing gradually more and more tempestuous, the bats began to retire to their den about 10 o'clock.

The following day was wet and stormy; only one bat came out, and at 10 o'clock all was quiet. The 27th was a wet day; it cleared in the evening; seventeen bats only came out; they had grown now very wary, and would not come out unless all was quiet outside. *V. Daubentonii* was easily distinguished on the wing from the pipistrelle, and also when coming out of the hole, as the former flew straight out, while the latter crept to the edge of the wall, and let himself drop from thence. The flight of Daubenton's bat is not so rapid as that of the pipistrelle, nor can he make as quick turns in his flight, hence Daubenton's bat is easier caught; when struck into the water, this species also floundered about, incapable of rising; the other just touched it, and was off. The fetid smell of the pipistrelle also was appreciable enough, and its cry is much shriller than that of Daubentonii.

Daubenton's bat in confinement was gentle, submitting to be handled, merely gaping with its mouth, and uttering a soft chirp; it fed on flies and raw meat readily; when the fly was out of the bat's sight it took no notice of it, even although crawling over its nose. In a room, this bat struck himself repeatedly against the ceiling, &c., endeavouring to escape, and I also captured several by holding the net steadily before the hole. In climbing, the exerted portion of the tail is used as an additional foot.

The total numbers of bats observed during my trip, and their proportions, as nearly as I could judge, were as follows:—

June 23.	<i>V. Daubentonii</i> ,	27	—	<i>V. Pipistrellus</i> ,	14	—	Total,	41
„ 24.	„	20	„	9	„	29		
„ 25.	„	1	„	0	„	1		
„ 27.	„	11	„	6	„	17		
Total,		59	Total,		29	Total, 88		

So that here *V. Daubentonii* is commoner than the so-called common

bat. The species may be confounded with both *V. Nattereri* and *V. mystacinus*, agreeing with both in the fringe to the interfemoral, although this character has been pointed out as distinctive; it differs from both, however, in the arrangement of the lines on this membrane; in the reddish-gray bat, these are few in number, and very strongly marked; in the whiskered bat they are numerous and distinctly marked, whilst in Daubenton's bat they are numerous, but confused, running into one another.

The colour of the fur separates it from *V. mystacinus*, being decidedly of a reddish-brown tinge on the back in Daubenton's bat, and in the other dark, almost black; Natterer's bat is much lighter than *V. Daubentonii*. It has been seen that it agrees with the whiskered bat in bearing a moustache, but this in the whiskered bat is much more prominent and better marked. From its great abundance in Kildare, from whence my friend, F. Haughton, Esq., has since forwarded specimens, I think it likely it has been often overlooked elsewhere in Ireland.

Specimens are in the National Museum, and in the Natural History Society's Collection.

Reddish-gray bat; *V. Nattereri*.

Dentition: $\frac{3}{2}$, $\frac{6}{6}$; total, $\frac{18}{8}$.

Ears about the length of head, sinuate on outer margin; tragus straight, very narrow, pointed, two-thirds length of ear; fur reddish-gray above, whitish beneath; interfemoral with only eight (?) ciliated lines.

DIMENSIONS.

	Inches.
Length,	2.0
Spread of wings,	11.0

Locality: Scalp, a rugged, rocky mountain pass between the counties of Dublin and Wicklow. George Mangan, Esq., 1845.

Professor M'Coy gives the following description of the above, the only as yet recorded Irish specimen:—

"Spur or heel unusually long, extending nearly half-way between the hind-foot and extremity of the tail; edge of interfemoral from extremity of spur to the tail, crenulated and fringed with short, stiff hairs; oblique glandular bands of the interfemoral membrane do not exceed eight; head small; ears nearly equalling head in length, ovate; width two-thirds length, obtusely notched in outer margin; tragus, two-thirds length of ear, narrow, pointed; fur long, very soft, dull white beneath, with the base of the hair nearly black; above, reddish brown, with a tinge of gray; wings dark brown, with a tinge of gray."—*Saunders' Newsletter*, February 12, 1845.

The above specimen was until lately in the collection of the Natural History Society, Dublin. Professor M'Coy gives the locality of its capture incorrectly as Enniskerry, county of Wicklow.

Genus—Scotophilus.

Head oblong; forehead flat, swollen at the sides; wings somewhat thick.

Pipistrelle; Scotophilus pipistrellus.

Dentition: $\frac{2}{3}$, $\frac{2}{3}$, $\frac{4-6}{3}$; total, $\frac{14}{3}$.

Ears two-thirds length of head, notched on outer margin; tragus rounded at apex, sides parallel, nearly half length of ear; fur dark-red-dish brown above, slightly paler beneath.

DIMENSIONS.

	Kildare Specimen. Inches.	Dublin Specimen. Inches.
Length of head and body, . . .	1.75	1.6
„ head,	0.6	0.55
„ tail,	1.35	1.0
„ ear,	0.4	0.3
„ tragus,	0.18	0.13
„ forearm,	1.25	1.2
Spread of wings,	8.5	7.5

Tragus narrow, nearly parallel-sided, rounded at apex, same colour as ear; ears notched externally, ovato-triangular, naked; fur reddish-brown above, the roots of the hairs bluish-black, belly grayish, the roots of the hairs black, pale along the flanks; interfemoral triangular covered with hair near the body; interfemoral bands few in number, 6-8, confused; a deep sulcus between nostrils; the sebaceous follicles well marked, and fetid.

Habitat: holes in walls, nooks under rafters, &c.

Localities: Dublin, where it is by no means rare; Kildare, Levittstown; Kerry, William Andrews, Esq.; Down, William Thompson; probably distributed all over Ireland. The Dublin specimen (a female, of which the measurements are given above) was captured clinging to a wall on a public road near Dundrum in the middle of the day; it is a female, and not full grown.

Habits: this bat flies earlier in the season than any other. I have already noted some of the manners of the Kildare specimen when speaking of Daubenton's bat. In addition, I may add that in confinement it is very impatient, running up and down the sides of the net when captured, and squeaking and biting in impotent rage. It also was a great adept at dodging the net; not merely running up the sides of it, and escaping before I could bag it, but also turning in the net, and flying back again before it reached the end. In the cage it was perpetually in motion, biting like a little fury, and squeaking and traversing it in every direction. It fed freely enough.

Bats generally presumed to be this species are very often seen hawking by daylight in the winter. This winter (1858-59), which was a remarkably mild one, nearly every day I saw one at noon, during Octo-

ber, November, December, and January, flying about the bridges on the Dodder, near Donnybrook; but, not having procured the specimen, I cannot quote the species in certainty. I have also seen them, in the same months, in the streets of Dublin; so that it would appear that the periods of hybernation are irregular. I have never seen them in the depths of the night; about 11 o'clock is the latest.

Dr. R. Ball showed me a specimen, captured near Dublin, which answered perfectly to the description and figure of the pigmy bat of Leach, but it appeared to me only a young pipistrelle.

It thus appears that of the bats in Ireland we possess only six species to seventeen British (including *Pl. brevinus*, *V. dasycnemus*, and *V. Edilis*, and excluding *V. pygmaeus* and *V. emarginatus*); of these, *Sc. pipistrellus* is probably a northern species; *V. Daubentonii* and *Plecotus auritus* are southern Germanic; and *V. mystacinus*, *V. Nattereri*, and *Rhinolophus hipposideros* are probably Lusitanian, though not restricted Lusitanian. With respect to the species wanting in Ireland, there is no reason why the Greater Horse-shoe bat should not occur, at least looking to its European distribution. The Noctule may also possibly be found, and more probably the Serotine. All the other species, judging from their distribution in England, and rarity there, appear to have been introduced into that country after the separation of the islands, and therefore ought not to be expected to occur. There is so much confusion, however, regarding the synonyms of the Bats, that it is extremely hard to judge.

By reference to Mr. Andrews' remarks, before quoted, it will be seen that we have evidence of the existence of at least two species in this country which are not included in the above lists. One of these—that captured near Dublin—it is impossible now to speak about. The other, a large bat seen at Dingle, he thinks may possibly be the Noctule. It appears to me to be more likely to have been the Greater Horse-shoe. The dimensions of the Noctule and *Rh. ferrum-equinum* are so nearly alike, that on the wing they would be undistinguishable; indeed, the same remarks apply to the Serotine and Mouse-coloured bat (*V. murinus*) as well; and Professor M'Coy's notice of the genus *Rhinolophus* would rather refer to the Greater than to the Lesser Horse-shoe. At the same time, the record of even a seemingly vague and unsatisfactory note of the occurrence of any bat is of importance; for, as the history of the discovery of *Rh. hipposideros* and *V. Daubentonii* has shown us, such notes often lead the way to discovery.

The following analysis of the British species of bats, drawn up by me some years since, affords a key to the discrimination of the species which may be useful to inquirers.

The non-Irish species are inserted in italics.

CHIROPTERA.

- I. { Ears without an internal appendage (tragus); skinny appendage on the nose. *Rhinolophus* II.
Ears furnished with a tragus; no appendage on nose. III.

- II. { Posterior leaf of nasal appendage heart-shaped below; ears scarcely emarginate at apex and base. *Rh. ferrum-equinum*.
 { Posterior leaf lanceolate; ears distinctly emarginate externally at base and apex. *Rh. hipposideros*.
- III. { Ears united at base. IV.
 { Ears free at base. VI.
- IV. { Ears small, rounded, scarcely longer than head. *Barbast. communis*.
 { Ears large, elongated, more than half as long again as head. V.
- V. { Ears twice length of head; tail longer than forearm. *P. auritus*.
 { Ears shorter than head; tail equal to forearm. *P. brevimanus*.
- VI. { Head oblong; forehead flat; eyes small, hid in fur. *Tragus* rounded at tip. *Scotophilus*. VII.
 { Head round; forehead convex; eyes exposed; dentition, false molars, $\frac{6}{8}$; total, $\frac{18}{8}$. *Vespertilio*. XI.
- VII. { False molars, $\frac{2}{4}$; total teeth, $\frac{14}{8}$. *Sc. serotinus*.
 { „ $\frac{2}{4}$; „ $\frac{16}{8}$. VIII.
- VIII. { Wings densely hairy beneath forearm. *Sc. Leisleri*.
 { „ smooth beneath forearm. IX.
- IX. { Expanse of wing exceeding 12 inches. *Sc. noctula*.
 { „ less than 12 inches. X.
- X. { Belly much lighter than back. *S. discolor*.
 { „ nearly same colour as back. *S. pipistrellus*.
- XI. { Bands on interfemoral few in number (8). V. *Nattereri*.
 { „ numerous, exceeding 8. XII.
- XII. { Expanse of wing exceeding 12 inches. *V. murinus*.
 { „ less than 12 inches. XIII.
- XIII. { Face furred; moustache on upper lip. XIV.
 { Face naked; no moustache. XV.
- XIV. { General colour of fur blackish; moustache well marked. V. *mystacinus*.
 { General colour of fur reddish. V. *Daubentonii*.
- XV. { Ears deeply notched externally. *V. dasycnemus*.
 { „ rounded externally. *V. Bechsteinii*.

[WILLIAM ANDREWS, M. R. I. A., President, read the following paper on Friday, March 4 (*vide* p. 374)—

ON THE DISTINCTIVE HABITS OF BRITISH HYMENOPHYLLUM.

IN the examination of any subject of interest in the Natural Sciences, whether in relation to Botany or Zoology, we are ever guided by those characteristics that determine with some degree of accuracy generic and specific differences: hence anatomical structure and physiological deductions are, through their minute investigation, the surest means of arriving at definite and truthful results. In the former science the application of the rules of morphology may restrain the extent to which laws can assign limits of variation to a given species. I have been led to offer a few remarks this evening, from a perusal of the "Handbook of the Flowering Plants and Ferns of the British Isles," by George Bentham, Esq., F.L.S., recently published, in which he has reduced the plants indicated as British in the late works of Hooker and Arnott's "British Flora," and in Babington's "Manual," by the suppression of presumed erroneously introduced species, by the number of 286 in the former work, and 423 in the latter. I have ever advocated in this Society that the young naturalist had, in the advanced state of science, greater opportunities, and that more merit would result from an investigation of a revision and correction of our zoological and botanical nomenclatures than in new discoveries or additions to our Fauna and Flora. Although it is extremely difficult to form opinions as to the limitation of species, yet I fully concur in the views of those who consider that species have been multiplied far beyond their due limits. Still, extremes in either sense are questionable, for even the non-existence of distinct species has been asserted. I am aware that from distribution, locality, or peculiar circumstances of habitat of plants, much variation and departure from the normal or typical form may be seen, and those characters maintained even under cultivation, and continued through seedlings; yet such cannot constitute specific differences, when no essential departure can be shown from the principles of fructification which marked the original form.

My observations on Mr. Bentham's work (a gentleman whose high scientific position and botanical zeal deserve our admiration and respect) are solely with reference to the plants of this country, wherein omissions and alterations of the hitherto recorded lists of the flowering plants and ferns of Ireland occur. My present remarks will be confined to the genus *Hymenophyllum*, a family the most beautiful and minute of our native Ferns, when seen in all their luxuriance of growth in the primeval woods, or on the rocks of the Alpine districts of the wild and moist atmosphere which characterizes the south-western parts of this country, their beautiful and singularly delicate fronds extensively spread like a velvet carpet of the most rich and verdant hue. Of this genus we have two well recorded and described species, *Hymenophyllum Tunbridgense* and *H. Wilsoni*; but the latter, in Mr. Bentham's recently published "Hand-

book," has been discarded, but with what utility is to be seen. It is needless to refer to the works of the older botanists—as Ray's "Synopsis," Withering's "Arrangement," Hudson's "Flora Anglica," Bolton's "Filices Botanicae," and others—for much confusion appears with regard to the species *Tunbridgense* and its localities, its habits and peculiarities appearing to have been but indifferently known, especially when we find that delicate species quoted by Ray and by Withering as growing amongst pebbles at Cockbush, on the coast of Sussex; and when we still further refer to that excellent work, "Species Filicum," of Sir William Hooker,—we find such numerous affinities and synonyms given as the views of different botanists, at pages 95 and 147, and following, completely perplexing the species *Tunbridgense*, *Wilsoni*, and *Unilateralis*. On such grounds I presume that Mr. Bentham considered the propriety of excluding the two latter, and retaining but one British species, *Tunbridgense*.

There is no tribe of plants to which I have devoted more patient investigation and practical research amid the alpine and subalpine districts, and the wooded glens and ravines of the western and south-western parts of this country, than to those of the genera *Trichomanes* and *Hymenophyllum*. As my remarks are with reference to the latter genus, it is proper that the distinctive characters should be given, and to submit to you, in the recent state, masses of each species. It is not necessary to go into detail, when the excellent descriptions, which are well defined, can be readily referred to in Hooker and Arnott's "British Flora," p. 592; Hooker's "Species Filicum," vol. i., p. 95; Wilson's "Observations" in Hooker's "Journal of Botany," vol. i., p. 317, and again in "Supplement to English Botany," T. 2686. I may, however, mention that the characters of *H. Tunbridgense*, as distinguished from *H. Wilsoni*, are the broader, almost lanceolate, and more delicate structure of frond, which is of larger size, pinnæ are pinnatifid, with numerous segments, distichous, or pointing in opposite directions, and flat; the involucre, both in the early stage and in the ripened state of the capsules, broadly ovate, or, more properly, sub-rotundate, invariably toothed or spinous, and swollen only at the base; colour, pale glossy green. In *H. Wilsoni* the pinnæ scarcely pinnatifid, and with fewer segments than in *H. Tunbridgense*, the pinnæ unilateral and with the rachis curved in a direction contrary to that of the fructification; involucre numerous, truly ovate, each valve remarkably convex, gibbous or inflated throughout, touching only by their edges, which are entire, and destitute of the toothed or spinous character of the valves which distinguish *H. Tunbridgense*, a plant of smaller size than *Tunbridgense*, more rigid, of a strongly reticulated nature, and of a darker or lurid green.

It is, however, in the distribution of these plants in this country that we find a wide separation. The *H. Tunbridgense* is decidedly a sub-alpine plant, affecting and assuming a luxuriance of growth only in the moist and sheltered glens and ravines of the south-western parts of this

country, especially amid the screen of aged woods, where perpetual shade and moist and even temperature favour its full development. There it may be found extensively mantling the broad surfaces of vertical rocks and of banks, and its drooping and overlapping or imbricated fronds, spreading in masses, display a most lively and delicate green. In such localities *H. Wilsoni* cannot be traced. It is also more rarely met on the trunks of trees than *H. Wilsoni*, and its habit more sheltered from undue moisture. In the south-western parts of Ireland, in the glens around Killarney, more especially in those of Cromaglouin, and in those of Gloun Caragh, westward of the Reeks, it is met with in all its beauty. In my botanical excursions in the county of Wicklow with the late Mr. Nuttall, I have not met with *H. Tunbridgense*, although *H. Wilsoni* is most frequent; neither have I seen it in Connemara or in Sligo, where, very likely, glens have been explored. In all those localities I have never found a departure from the described habit of growth, nor alteration of the characteristics given, neither any intermingling nor approach of the two species in the localities which most favour the growth of each. The habits of *H. Wilsoni* are very different, affecting much more elevated and exposed positions, and greater exposure to atmospheric influence and rain, as well as arid and exposed rocks. In the recesses of the rocks of our highest mountains, particularly their northern and eastern aspects, the *H. Wilsoni* exhibits the same characters as found in the more exposed glens, where it coats rocks and trunks of trees with its peculiar crisped, curved, and rather erect habit of growth. On the summits of Brandon, Benisgeach, Cahirconree, and Mounteagle, in Kerry, and even on the cliffs of the Great Blasket Island, this species is met in rich abundance; but in those localities no approximation can be traced in it to *Tunbridgense*. *Wilsoni* is much distributed in the western parts of Ireland, as also in the northern and eastern counties.

It is clear that in this country *H. Tunbridgense* delights in localities where shade and a mild and even temperature encourage its growth. In warmer countries and tropical climates high altitudes are more conducive to the healthy existence of *Hymenophyllum* and *Trichomanes*. Bory de St. Vincent, to whom I shall have particularly to refer, mentions in his notes on Algerine Botany the delightful temperature of the province of La Calle, where a perpetual spring exists, for the centigrade thermometer has never stood below 11 degrees, nor risen above 30 degrees in the shade. The forests of La Calle abound in beautiful ferns, and where he mentions the great height of *Osmunda regalis*, and the gigantic leaves of the ivy. It is singular that he states the male fern, *Aspidium filix-mas*, does not occur in Africa; nor, according to "Low's Memoirs" of the plants of Madeira, does the genuine *Aspidium filix-mas* exist there. Holl, on the Plants of Madeira, alludes only to one species of *Hymenophyllum*—*Tunbridgense*, growing at an elevation between 2000 and 3000 feet. In the Floras of France the species *Tunbridgense* is recorded, and is mentioned as growing on the trunks of trees at Cherbourg.

I shall now come to a more important point,—the opinion generally

entertained by botanists, that *Hymenophyllum Wilsoni* of British botany is none other than the *H. unilaterale* of Willdenow's "Species Plantarum," p. 521. We are aware how very nearly some of the exotic *Trichomanes* and *Hymenophyllums* approach in form and habit of growth; yet the character and position of the involucre in many species are very different. What may be the true characteristics of the involucre of *H. unilaterale*, we are in some measure left to conjecture. No descriptive terms can clearly determine the doubts entertained of a species. Accurate drawings of the recent plant, or authenticated specimens, should only be advanced as confirmatory of the decision of disputed views. Again, there are difficulties of deciding species of exotic ferns, when reference is to an ill-preserved Herbarium, and where accurate notes do not exist of peculiarity of locality and of habit. According to Hooker's "Species Filicum," *H. unilaterale* of Willdenow, from a specimen from Martins, proved to be the species *Tunbridgensis*, and *H. unilaterale* of Willdenow, according to description, was *H. Wilsoni*, but not according to a specimen from Martins. Some years since, being much interested in the affinities of *Trichomanes* of this country with the forms of *Trichomanes alatum* and *T. radicans* of Jamaica, I had many communications with that amiable and liberal promoter of science, Sir William Jackson Hooker, Director of the Royal Gardens, Kew. I had also favourable opportunities of communicating with the celebrated Bory de St. Vincent, from the desire of knowing the characters and obtaining specimens of *Trichomanes longisetum* and of *Hymenophyllum unilaterale*, discovered by him in the Isle of Bourbon. I give an extract from his reply, dated Paris, 14th of February, 1845:—"The plants which interest you were discovered by me in the thick forests of the Island of Bourbon, and these were communicated at the time to Willdenow, to Ventenat, and to the old Jacquin of the neighbourhood, who were then my correspondents of those countries. They have not yet found them, no more than three or four other rare species." There, therefore, does not really exist in any of the herbaria in Britain an authentic specimen of the *Hymenophyllum unilaterale* of Willdenow. Under these circumstances, and with reference to the habits of the two species of this country, I would venture to suggest that the species *Wilsoni* be retained in the list of our Irish ferns as a slight tribute to the merit of so zealous an observer, and so distinguished a cryptogamic botanist, as William Wilson, Esq., of Warrington, who, in August, 1829, first drew attention to the distinction, in the neighbourhood of Killarney, of the two species of *Hymenophyllum*.]

WILLIAM ANDREWS, M. R. I. A., President, read the following paper:—

FURTHER REMARKS ON HYMENOPHYLLUM.

I WOULD not again have trespassed on the Meeting, but I was desirous of giving some explanation with regard to the habitats of the species of *Hymenophyllum*, which my last statement, perhaps, did not

sufficiently convey; and at the same time I feel called on to make some comments on the presumed discussion on that statement which appeared in "Saunders' News-Letter" of the 16th of last month, and which was not published through the authorized channel of the Society, nor did it convey the points strictly in accordance with the verbal expressions and views given at the meeting. In alluding to the localities of the species *H. Tunbridgensis* and *Wilsoni*, I merely at the time gave the characters of the extreme habitats of each, showing that the former required a more shaded and even temperature for its perfect growth and development than *Wilsoni*, and that in the alpine and exposed positions favourable to the growth of *Wilsoni* the species *Tunbridgensis* was not observed; that on the confines of such habitats both *Wilsoni* and *Tunbridgensis* may be found in the same immediate localities together, and each presenting its peculiar form of frond and distinctness of involucre. Mr. Wilson has observed to me "that the two species are usually found apart, and that *H. Tunbridgensis* is confined to lower regions than the other species, as must be obvious enough to those who have taken any pains to study them in a wild and growing state." Dr. E. Perceval Wright, F. L. S., made the first remarks in this important discussion, to the effect that he perfectly understood from Mr. Andrews's statement that it went to prove the identity of the two forms, and that the question of species was one not to be settled by assertion; that the habits of plants growing in sheltered glens and of those exposed to the influence of the Atlantic in our western islands, in such a limited Flora as that of Ireland, could not, from their altered character of growth, be construed into distinct species; travel alone could give sufficient experience to decide such questions of difference of habit which growth and climate presented; that the distribution of those ferns was world-wide, and a form common in Norway could not be considered as a southern type. He further remarked that if, as Mr. Andrews stated, difference of habitat could never alter the fructification of ferns, and that, therefore, in Dr. Wright's opinion, this constancy of fructification, if proven, would at once establish species, and set the question of species for ever at rest. Dr. Wright did not object to local varieties being distinguished by names, as it was of some importance to know of their existence, proving, as they did, how climatal influence seemed to alter forms. Professor Harvey is reported to have stated that he agreed in considering the two forms as one species; but that botanists having only a knowledge of British botany would at once be led astray in the matter; that fructification was not a constant character in ferns. Sir William Hooker, owing to a great difference on this point, had placed a fern—*Ceratopteris*, from the tropics—in a separate family from *Parkeria* from Demerara; but since intermediate forms had been found, which united those two so different-looking varieties not only into the same genus, but into the same species. Even in the common Hart's-tongue, fructification assumed different positions. These were the leading points that were put forward as the views of Dr. Wright and of Professor Harvey in the unauthorized statement, and, as I have remarked on their incorrectness,

are certainly not given in the manner as expressed by Professor Harvey. Upon these points I shall make observations as concise as possible, leaving Professor Kinahan to explain more properly his own statements.

I cannot imagine in what manner Dr. Wright was led to suppose that the characters of aspect and habit, as well as of the peculiarities and forms of the involucre described by me, went to prove identity. In the introductory part of my former statement, I, in a very guarded manner, explained the difficulties of demonstrating specific differences, and in general terms mentioned the principles of fructification as of important bearing in distinguishing the characteristics that would mark the original or normal form. It was unnecessary to go into detail of those definitions with regard to venation, the direction of the venules, the form and position of the sori, and the character of the indusium, or its non-existence, for they are known to botanists; but it never could be imagined that such alone constitute specific differences; for the general aspects and habits of species may be very different when the venation and the character of the sori are the same. In the present instance the specific distinctions are supported by the aspects and habits of the plants, which locality does not alter; and in the different character of the involucre—characters which, as shown in continental works, and in those on exotic ferns, prevail through all the genera. I do not infer that correct deductions can be established in all such cases; yet where good apparent distinctions can be shown, it would be better to allow the privilege of their retaining their local names, to which Dr. Wright does not object.

Limited as the Flora of Ireland may be, yet the botanist well grounded in the practical science of that field may be as competent to understand the merits of a good exotic herbarium as many who employ themselves in describing plants which they have never seen in the growing or in the recent state. I mentioned *Aspidium spinulosum*, which assumes, according to locality, such a variety of aspects, from its growth in the deep, sheltered glens to the highest mountains, to which were applied the specific terms *Fœnisceci*, *Dilatatum*, *Recurvum*, *Dumetorum*, &c., yet the characters of fructification were unaltered, and in its stunted state on the mountain top bore copious fructifications. Dr. Wright, however, would imply that the distinction of the form of the involucre in *Wilsoni* from that of *Tunbridgensis* was altered by the change from a shaded to an exposed position. In the world-wide distribution of those plants it does not appear that the form described by Willdenow, under the name of *Tunbridgensis*, as extending to Norway and Northern Europe, was other than the not then described form *Wilsoni*. There is no record by Willdenow of the existence of *Hymenophyllum unilaterale* in Europe, and the form now described by continental botanists under that name is probably none other but *Wilsoni*. Professor Harvey stated that he agreed with Professor Kinahan and Mr. Andrews that those plants in this country were perfectly distinct; yet that, on the Continent, they were found to run so much into each other, that he was of Mr. Bentham's opinion, that

they were but the one species. I do not immediately understand the meaning of the point, that *Ceratopteris* from the tropics was placed in a separate family from *Parkeria* from Demerara; but that intermediate forms had been since found, which united those two different-looking varieties into not only the same genus, but into the same species. The great division of importance of ferns into groups is characterized by the Sporangia being destitute of, or furnished with, an elastic ring, thus forming three sections—the exannulate, the transverse annulate group, and the group with a vertical ring.

From what I could glean from Professor Harvey's statement, he made it appear that the large globose sporangia of *Ceratopteris* had a broad transverse ring; in *Parkeria* it was nearly obsolete, or exannulate, which led Sir William Hooker, from two specimens of one species, to form separate genera; but recent specimens, and those subsequently cultivated, proved that they both possessed an elastic, not a transverse, but a vertical ring, thus placing them in the one proper group. It was no error of judgment of Sir William Hooker, but misconception from the examination of imperfect specimens, especially in a fern like *Ceratopteris*, which presents two forms of frond. The marshes of Java afford this fern in abundance. The perplexity arose in the describing of plants which have not been gathered in their developed or perfect state, and in the difficulty of collectors in tropical countries preserving their herbaria, often saturated by rain, attacked by insects, or injured by accidents which cannot be guarded against: often have subscribers, in opening their packages, been horrified at finding their choicest specimens unfit for examination. The indefatigable George Gardner, when in the interior of Brazil, in the province of Goyaz, laments the sad misfortune to his dried plants. On crossing the Rio de Peize his horse stumbled, and the packages of the entire of his labour for weeks in a district hitherto unexplored by botanists, were immersed, and completely saturated. Even Mr. Bentham admits these difficulties. The action of water on aquatic plants in destroying their characters is not uncommon. In foreign herbaria, in the cover of *Myriophyllum*, are often found specimens of *Ranunculus*, *Cabomba*, *Ceratophyllum*, *Limnophila*, *Dysophylla*, *Anacharis*, &c. The *Limnophila gratioloides* has already been described among *Caryophyllææ* and among *Primulacææ*.

Again, I do not understand the observations, "that in the common Hart's-tongue, fructification assumed different positions." The characteristics of the genus are, that the sori are parallel in two rows, very numerous, arranged in a longitudinal linear fissure on the frond, assuming different lengths, and the indusium attached along both sides. Any alteration of such characters must constitute a different genus. The character and position of the sori establish generic distinction; the habit of the plant in the same genus determines specific difference. In *Tæniopsis* and *Vittaria*, which have been separated into different genera, the habits of the plants of each scarcely indicate any distinction; yet in *Vittaria* the margin of the frond is slit longitudinally, forming two narrow laminae,

with the sporangia, arising from the base or axis of the the slit or groove, pointing upwards, distinguishing the genus from *Tæniopsis*, which is characterized by the sporangia being produced in a similar groove, but which is situated on the disk within the margin of the frond. I do not, therefore, consider that the reference to *Ceratopteris*, or to the common Hart's-tongue, has any analogy bearing upon the point of discussion. In a conversation with the distinguished Robert Brown on the character of the *Trichomanes* of Glouin Caragh, in Kerry (a man of whom Sir Robert Peel observed, "his retiring modesty and unpretending merit were the index of a great and talented mind"), that first of botanists assured me that it was the type of the European form, and that it established its identity with *Trichomanes radicans* of Jamaica. It was the clime, from its western position, and influenced by the broad Atlantic, that gave such luxuriance of growth and such copiousness of fructification; and he smilingly observed, "I do not know how I fell into the error of naming it *Brevisetum*." The Glouin Caragh plant was the normal European state of that fern. Sir William Hooker, in writing to me on the same subject, expresses—"It is an honour to your country to have a West Indian plant growing there, and tells volumes in favour of the mildness of the climate."

The same may be applied to the two species of *Hymenophyllum* of Kerry: they are the types of the European forms of that genus, and are specifically distinct in aspect and habit. I consider those of the Continent to be but mere sub-forms, apparently running into each other; but I should like botanists to prove that they can show the distinct forms and characters of the involucre of *Tunbridgensis* and of *Wilsoni* existing together on the same frond. Mr. Wilson observes to me that his Welsh specimens of *H. Wilsoni* are pigmies compared with those obtained from Killarney. The *Adiantum capillus-Veneris* of the Aran Isles, and of Burren, in Clare, is identical with the forms of Madeira and of the Canary Isles, which were termed *Adiantum Africanum* by Robert Brown, in his Appendix to "Tuckey's Voyage." These forms are monstrous when compared with the stunted growth of those of Cornwall and of the south of Europe, and even of those which have been noticed in wells and in moist caves in the neighbourhoods of Rome and Naples (the specimens exhibited from Cremleigh Point, in Clare, and from Aran, were eighteen inches in length). The *Hymenophyllum Boryanum*, discovered by Bory St. Vincent in Bourbon, of which I submit beautiful specimens, is very similar in outline and reticulation of pinnæ to *Tunbridgensis*; but it differs materially in aspect in the hairy underneath part of the frond, and in the branched hairs at the margins (which seem very characteristic of exotic species); the involucre is suborbicular, ciliated, and sunk in the frond. It is closely allied to *H. ciliatum* of Brazil, but specifically separated by the different character of the involucre. Again, referring to Willdenow (p. 519) what distinction can be shown between *H. hirtellum* and *H. ciliatum*, but merely in the more ovate form of the frond and in the differently shaped involucre? *Hymenophyllum unibria-*

tum is closely similar to *Hymenophyllum flexuosum* of New Zealand, but differs in the margin of the indusium being fimbriate. Other cases could be adduced where the distinctions shown in botanical works are not more strongly marked than those that separate *Wilsoni* from *Tunbridgensis*. In submitting to the meeting the beautiful specimens of *Adiantum asarifolium* from Bourbon, it must necessarily be seen how slight, in accordance with the present views, are its specific differences from the *Adiantum reniforme* of Madeira. The venations in both plants are the same, the character and position of the sori precisely similar, the Bourbon plant only differing in presenting a more robust habit of growth, and in the character of the deep sinus in the frond. The Bourbon plant may be considered the type, the Madeira and those of the Canary Isles, the sub-type, of the one species. Yet in the peculiar features of each plant, which are constant throughout, there are fully sufficient grounds in the aspect, habit, and locality of the Bourbon plant to justify specific distinction. I am, however, in correspondence with friends, both in Bourbon and New Zealand, who will probably send me this plant, and those of *Trichomanes* and *Hymenophyllum*, packed in a manner which I have found very successful in keeping them in a living and fresh state for many months without injury.

I had no intention in my former statement, nor in this, to dispute the views of Mr. Bentham, as I am perfectly aware of the difficulties that still beset the classification of ferns. However, in his inroads on British Botany he has raised a host of labour which years cannot accomplish, and which all his experience of Continental herborization will not be equal to. I am far from disagreeing, however, in the judicious reduction of the too numerously recorded species, but the enlarged views which shrivel specific distinctions into nonentity will involve no useful end, and will certainly render the study less intelligible and less pleasing. I do not pretend, neither do I venture, nor do I desire, to contend with the great botanists of the day; but, having been well-grounded by the admirable practical botanical demonstrations of my esteemed friend, Dr. Mackay, the father of Irish Botany of that period, and with the recollection of the field labours and of the pleasing botanical companionships of those days, I hope I may, without presumption, venture an opinion.

PROFESSOR KINAHAN stated that on the last evening, when the subject was before the Society, the length of the discussion which then took place had deterred him from making as full a statement as he would have wished of his views, though he could hardly call them his, as they were those held by more than eight-tenths of the field practical botanists both in the British Isles and on the Continent—in fact, he might say all over the world. The remarks he had made had been so misquoted, or misunderstood, that he felt it due both to himself and to the author of the paper on the *Hymenophyllum* to enter more fully into some of the arguments then brought forward. It had been stated, or at least hinted, that the advocates of the specific difference of these forms had only assertion to

support their side of the question. This Dr. Kinahan had most unequivocally denied, and he was much surprised at such a statement, where the specimens then exhibited showed the distinctions of the species so plainly. He would even venture to retort the statement, as, if unsupported assertion is an argument relied on by either side, it is certainly by those who advocate the union of the species, as he hoped to show.

Another fallacious statement brought forward was, that if Irish botanists had an opportunity of examining a wider field, they would be likely to change their views. This certainly is mere assertion, for any one who takes the trouble of examining the list of localities given in the "Species Filicum" will see that independent botanists, who *have* travelled, have, in different and remote parts of the world, *all* distinguished these two forms as species, so that, supposing them to be mere varieties, the same modifying causes which exist in Ireland exist in nearly every locality in which the ferns, or either of them, have been found. Furthermore, in two localities in Ireland, and, doubtless, there are many others, the two forms grow absolutely together—the plants of each, though intermingled, being perfectly distinct. It might be well to state that in a letter, received only this morning from Mr. F. J. Foot, he states that, as far as Killarney is concerned, the two species are met together, and in that station Dr. Kinahan might remark that the finest specimens he had ever seen of both species occur. Professor Harvey had borne testimony to the accuracy of the statements as regarded these genera in Ireland and their seeming distinctness; and this testimony Dr. Kinahan looked on as peculiarly valuable, as Professor Harvey is a staunch supporter of the unity of the species. If these two are mere varieties of one another, how is it that both flourish, and so abundantly, in the one locality? and how is it that the circumstances favourable to one do not cause the transmutation of the other?

The great argument rested on by the unity of the species advocates is the existence of intermediate forms; but what is meant by the term "intermediate form?" Have perfect specimens ever been exhibited which would cause hesitation for a moment? Are any specimens known possessing both forms of involucre on the same plant? or possessing involucres of a mixed character? Till such are produced, or till it can be proved that by any kind or amount of culture one can be converted into the other, the argument of intermediate forms is inadmissible. True intermediate forms run into each other under cultivation. Dr. Kinahan had examined these plants in innumerable stations in Ireland, and frequently under cultivation, and must say he had never seen or heard of a case. If by "intermediate form" is meant a specimen or plant in which the figure and direction of the frond, or, as it is commonly called, the *habit*, of the one species is simulated by another, the character of the involucre remaining constant, the union of the species, on that ground only, must fail; for *all* the essential characters are not identical. Is there such a thing known as any two species widely differing in their characters, between which *gradational species* do not occur? And are we

justified on *this* account alone in uniting the two, and thus converting species into genera? Dr. Kinahan had spent much time and labour some years since in investigating changes of form to which the frond in ferns is liable, and the result of these investigations showed him that, although in some cases these abnormal forms might be perpetuated under cultivation for several generations, that this was alone attributable to constant watching and culture, as there is always a tendency to revert to the original form, and the plants almost invariably revert to it when deprived of the advantages of their artificial training. Arguments drawn from such examples must, therefore, be excluded when we come to plants in a state of nature; for among these latter, when modifications of character, owing to peculiarity of habitat, occur, we find that, in the first place, the varieties are local, not as in the case of the species now under consideration, where the two forms are wide-spread, and frequenting often the same districts; and next, when natural varieties are placed under the same culture as plants of a normal type, they almost always return to it. It is further to be remarked, that when either of the species under consideration are found growing in extreme abnormal situations, the only changes which take place (exclusive of extinction) are in the frond, the involucre remaining the same. *Hymenophyllum Tunbridgensae* growing on the bare face of a grit rock, facing the north-east, at some hundreds of feet of elevation, unsheltered either by trees or overhanging rocks, as on Monounta Hill, near Feakle, county of Clare, though stunted in its growth, preserves all its other characteristics equally with plants growing in the most favourable situations in Killarney; and *H. Wilsoni*, in its Killarney and Tipperary situations, sheltered from the wind and sun, becomes merely taller and more luxuriant, differing in no other respect, save that of fruiting more sparingly, from plants carpeting the wind and spray swept rocks of Valentia Island.

Much had been said about the advantages of travel in enabling us to form a correct judgment as to the unity or not of species; but, on the one hand, have all who contend for unity of those species possessed this advantage?—and had any of them brought home specimens of the much-quoted intermediate forms?—and, on the other hand, had the supposed advantages derived from travel been enjoyed only by those who argue in favour of the union? Had *none* of its opponents ever been equally favoured, either in this respect or in the advantages to be derived from examination of herbaria and living foreign species? For his own part, it appeared to him that Linneus's great axiom, "I own no master but observation," was entirely overlooked, and in its place what logicians call the "argumentum ad hominem" substituted.

For himself, until better arguments were brought forward, he must decline following blindly at the beck of any master in matters in which every observer of common diligence can judge for himself; and, therefore, preferred ranging himself among those whose observation of the plant in the field, and examination of it under culture, led them to believe in the distinctness of the species. It had been stated that because

the plant is said to have occurred in Norway, therefore it could not be a southern form. Surely the gentleman who made that remark had forgotten the southern shells found in that country, and in the seas much farther north, and which are, nevertheless, considered as southern types by some of our greatest and most philosophic naturalists.

He next would allude to some of the arguments brought forward by Professor Harvey; and Dr. Kinahan felt much difficulty, because it might be thought to be presumption in him to venture to express an opinion contrary to an authority deservedly of so high a reputation; but it appeared to him that one of the arguments brought forward in reply to Mr. Andrews was really of no weight in this case. The case of *Parkeria* quoted merely showed that even such a great botanist as Sir W. J. Hooker may attach too great value to a single trivial character. Every one who has studied the ferns living must know, that of all the characters selected as specific and generic, the least valuable and most uncertain are those derived from the form, presence, and position of the transverse ring. Indeed, he almost questioned the utility of the characters at all. The example quoted, besides, was an instance of what was already stated, viz., the value of cultivation in showing the distinctness or identity of two plants.

The change in the position of the sori of *Scolopendrium* had been quoted; Professor Kinahan had himself, as the records of the Society show, exhibited to the members specimens in which the sori were partly on the dorsal, partly on the frontal aspect of the frond; but even in these the variations were more seeming than real, the relations between the woody bundles of the plant and the sori remaining constant, even in the most monstrous specimens. The argument drawn from the presence of both ferns in almost every locality where one occurs has been already shown to be an argument in favour of their distinctness. It is inconceivable that the same modifying causes could exist in all the counties in which these ferns are found. So that it appeared that, of the arguments adduced to prove the inconstancy of the fructification, one only exists,—a change in an organ of very minor importance. One statement of Dr. Kinahan's on the former night had been totally misunderstood, viz., the value of foreign travel. What he said was, "that if, because in the course of travel we find gradational forms between what were considered species, that therefore we are justified in uniting in one the extreme species connected with that gradational form; and the only result we would attain from such travel would be the reduction of nearly every known species to one, and that to include these forms our definitions of species would finally come to be generic, and not specific." One other argument, or rather statement, seemed scarcely to need notice, viz., that if in these species fructification was the most striking and constant diagnostic character, that therefore it was the only character, and also diagnostic all through the forms. Just as well might we argue, that because certain colours and markings are diagnostic of species in some birds, that therefore colour must have equal value among all birds—a statement

which a very little research would soon prove to be fallacious. Dr. Kinahan must, therefore, still hold to the distinctness of these species, believing that by species is meant a being possessed of a certain definite arrangement of organs,—this characteristic arrangement not being possessed by any other form as an entirety, though some of the characters may be possessed by other species.

The further discussion was by special resolution postponed till the next meeting.

FRIDAY EVENING, MAY 6, 1859.

WILLIAM ANDREWS, M. R. I. A., President, in the Chair.

THE previous Minutes having been read, were signed.

THE PRESIDENT rose and said, that before the papers announced in the summonses for the evening were read, a most unusual course of proceeding in the Society was to take place—an adjournment from the previous meeting, to discuss the subject of a paper given at that meeting. This was in accordance with a special resolution passed at that meeting, “That the discussion on Mr. Andrews’s paper on *Hymenophyllum Tunbridgense* be postponed until the next meeting.” He would be glad, therefore, to hear any remarks that were to be made, on the subject of the resolution.

REMARKS ON THE BRITISH HYMENOPHYLLUM. BY E. PERCEVAL WRIGHT, A.M.,
M.B., F.L.S., LECTURER ON ZOOLOGY, UNIVERSITY OF DUBLIN.

DR. E. PERCEVAL WRIGHT, F. L. S., read the following :—

It will be in the recollection of the Members that at the meeting of this Society in March last we were favoured by the President with a paper on the British species of *Hymenophyllum*, the chief aim of which was to prove the distinctness of the two species, respectively designated *H. Wilsoni* and *H. Tunbridgense*, in opposition to the dictum of Mr. Bentham, who, in his “Handbook of the British Flora,” places the former as a variety of the latter. The chief reasons urged for their distinctness were the difference in the involucre and their varied habit of growth—reasons supported admirably by the specimens exhibited, as well as by the experience of their author.

At the conclusion of the paper an interesting discussion ensued, in the course of which remarks more or less important were made by Professor Harvey, Dr. Kinahan, the President, and myself. It would appear that, without the authorization of either President or Secretaries, a somewhat garbled outline of this conversation appeared in a Dublin daily paper a few days after the authorized report of Mr. Andrews’s paper, which led to the discussion, was published. This unauthorized report, in a most unaccountable manner, not only, it would seem, misapplied, but misquoted, the real remarks that had been made; and so, on the very next night of meeting the President and our senior Secretary read, each of them, full details of what they had said—these details being also

interspersed with a refutation of what Dr. Harvey and myself were so unauthorizedly made to say.

In re-opening the discussion, it may be well, in the first place, to glance at the statement made at the last meeting, an account of which will be found in "Saunders's News-Letter" of the 6th of April, inserted from manuscript furnished by the authors; and, in the second place, to state the reasons which lead me to strongly acquiesce in the views of Mr. Bentham.

The pleasure that botanists feel in making the catalogue of their country's plants as extensive as possible, has (when injudiciously indulged) some tendency to warp their judgment; but truth being their only object, it seems but right that, in addition to their own judgment in the attainment thereof, they should avail themselves of the opinions of other experienced observers, whose opportunity to arrive at a just conclusion may be greater than their own. One who would positively decline to own any master but observation, let his powers of observation be what they may, would be little able to compete with the many talented pupils of Linneus that live at the present day.

So far as our present knowledge of the two forms of *Hymenophyllum*, as they occur in Ireland, goes, it is agreed, and never was for a single moment controverted, that they each fairly aspire to the rank of what is popularly called a species. It was not imagined by me that "the peculiarities and forms of the involucre, as described by the President, went to prove their identity." Far from it. Who would expect to see a cauliflower turn into a cabbage?—still less to see our Irish variety called *H. Wilsoni*, as described by Mr. Andrews, turn into *H. Tunbridgensis*? But what was stated by me was, that the extraordinary diversity of locality mentioned would, in such instances, and only in such, account for a very great difference in form and habit of growth, and that this mere difference could not for a moment be taken as decisive evidence as to their distinctness; and it is to be wondered how the President could state that "locality does not alter the aspects and habits of the plants in question," when, in specimens of his naming, examined in the Hookerian Museum, the aspects and habits of the plants are altered very materially by the localities they have come from; besides, the point is acknowledged by all botanists. As to the more important diversity in the shape of the involucre, it was not implied that the change from shaded to an exposed position had any affect in altering them, as Mr. Andrews seems to think. It is, however, somewhat difficult, it must be confessed, to be quite certain what the President means to convey as regards the specific value of this difference, for he at one time says "that the habit of the plant in the same genus must determine specific difference;" and at another time he seems to attach the chief importance to the diversity in the involucre. But assuming this latter to be, after all, the best ground of distinction, it is the one to which your attention will in a few moments be directed.

The President asks what difference more striking than those between *H. Tunbridgensis* and *H. Wilsoni* is there between *H. hirtellum* and *H. ciliatum*? My knowledge of exotic forms will not allow me to answer.

But is not the force of the argument completely lost when it is considered that, perhaps, if one had the same means of judging, the very same opinion would be pronounced upon them, viz., that they were the one and the same? There would be no difficulty in settling the matter, if, as the President asserted, the fructification of the ferns was a most constant character, one neither affected by the difference of growth or habitat, and one that would ever enable the botanist to arrive at a just and certain appreciation of their species. Would that this were the case! but every day's experience only proves the extreme fallacy of the opinion.

I would here like most emphatically to deny that Mr. Bentham "has raised a host of labour, which years cannot accomplish." On the contrary, he has saved us and all future British botanists from the dire labour of ever trying to know, and never knowing, an host of bad species, and there is at last a chance of the blackberry of our young days being still the blackberry of our maturer years. Sincerely is it to be trusted that still further enlarged views will shrivel (to use the President's words, slightly adapted) all false specific distinctions into nonentity, knowing that they will then render the science more pleasing and much more intelligible. Leaving Professor Harvey to defend the introduction of *Parkeria*, we pass on to briefly answer a few further statements.

But the whole of this matter resolves itself into the query suggested by Dr. Kinahan's concluding sentence, i. e., What is a species? It would be obviously unfair on such a critical subject to take an author's definition from the pages of any newspaper, especially when through some typographical error it would equally be a definition of any monstrosity 'which possessed a certain definite arrangement of organs, which being' hideously 'characteristic,' it 'was not' desirable should be 'possessed by any other form as an entirety.' But if species do exist, the extreme difficulty of defining them is almost enough to deter any one from critically attempting it. I must imagine, therefore, that you all have some idea of what is popularly called a species, and that you are equally aware that a species is liable to variations—these brought about either naturally by some change of climate or position, or artificially. I may also be allowed to state that it is almost proven that a variety, once established, is incapable of returning to its original condition: it will either die out or form a new variety. Of course monstrosities are altogether excluded from this calculation in the vegetable as well as in the animal kingdom. Thus the cauliflower (neither a monstrosity nor hybrid form) will continue to ripen its seed, and perpetuate its variety for ever, without in a single instance thinking of returning to the original *Brassica oleracea*, though it may possibly form new varieties of cauliflower; and we must wait for a long time ere we procure the original species of the dog, or any other domestic animal, by any of our present varieties giving birth to it. Thus much, in passing, to make use of anon in the question of these two varieties, and as it occurred to me when noticing the definition of species, which, of course, had it been perfectly complete, would have almost settled the question.

Dr. Kinahan states that independent travellers have distinguished these two forms in all parts of the world. This is scarcely accurate. Independent collectors and botanists have brought *Hymenophylla* from all parts of the world, and their species have been decided upon at home, with all the assistance of the practised observers in the field. I was well aware, and indeed stated, that both forms of *Hymenophyllum* had occurred to me growing side by side in the south of Ireland: so I can confirm Dr. Kinahan's remarks on this point, rather than contradict them.

From Dr. Kinahan's remarks, given in inverted commas, one might gather that he goes as far as could be desired in the range to be given to species; for of course if, in travelling, we find gradational forms between species, we are justified in uniting in one the extreme varieties, but there is little trust to be placed in such a series of gradational forms, gradually running into one another; nor is it necessary to prove that one can be converted into another by culture ere believing their unity.

Dr. Kinahan very justly criticizes my statement that as *H. Tunbridgensae* occurred in Norway it could not be called a southern form. This was, I confess, a careless statement, and I feel only too willing to withdraw it; but would suggest that there is some impropriety in calling a cosmopolitan species a southern form, as also that the occurrence in the northern seas of species found in the lists of a southern Fauna would not necessarily imply that the Flora of the shores of that same ocean partook at all of a southern type. Assertion in matters of this kind is worse than useless, and, if my memory serves me, even the mistake above alluded to was not made, as Dr. Kinahan inclines to think, as a statement, but rather thrown out as a suggestion.

Leaving the matter of the transverse ring to Dr. Harvey, it is now time to lay before you the facts which lead me to adopt Mr. Bentham's view of the union of these species, a view which will soon, I have no doubt, be held, not in the doubting manner of some, but from conviction, by at least eight-tenths of our practical botanists, both in the British Isles and on the Continent. To satisfy the President that the two species are one, it has to be demonstrated that the aspect and habits of the plants are altered by change of locality, and that the shape of the involucre varies. To satisfy Dr. Kinahan, one must prove either that by any amount of culture the one form can be converted into the other, or show a specimen having both forms of involucre on the same plant, or possessing involucre of a mixed character; or to prove that perfect specimens ever did exist which caused a moment's hesitation as to which species they belonged.

I have had opportunities of seeing the unrivalled collection of Sir W. J. Hooker at Kew, and of examining there specimens of *Hymenophyllum Tunbridgensae* and *H. Wilsoni* from almost every quarter of the globe, and the united testimony of my eyesight and that of Dr. Hooker, may satisfy the President when I state that nothing could well exceed the variation of the habit of the two forms from various localities. Examination also showed a great diversity in the serration or toothing of the involucre. In regard to Dr. Kinahan's first query, I cannot pre-

tend to say whether the one variety could by any culture produce a form like the other. If it did, from what I have previously stated, it would be likely that we have not yet got the original starting form. With regard to the second query, as to whether specimens exist about which there is any uncertainty as to which form to refer them to, it can be answered that most indubitably forms do exist in the Kew Herbaria which do perplex a Hooker and a Bentham. With regard to the last query, my attention was called by Mr. Bentham to a mass of *Hymenophyllum*, which exhibited a mixed fructification (partly resembling *H. Wilsoni* and partly *H. Tunbridgensae* on the same fronds). This specimen, we believe, convinced him on this subject, and we incline to think ought so unequivocally to settle this question as to render further allusion thereto needless. These answers contain the reasons that induce me to believe, with the author of the "Handbook to the British Flora," that *H. Wilsoni* is but an entire valved form of *H. Tunbridgensae*. Surely the development of spare parenchyma into the form of a few hairs or teeth is not enough, in the face of such proof—to cause scientific men still to make them distinct, because they find it a pleasing task to add to the botanical interest of their country by so readily supporting this view.

REMARKS ON THE BRITISH HYMENOPHYLLUM, ETC., BY W. H. HARVEY, M. D.,
F. R. AND L. S., PROFESSOR OF BOTANY, UNIVERSITY OF DUBLIN.

PROFESSOR HARVEY made some remarks in support of Mr. Bentham's views. He said:—

On the first evening of the *Hymenophyllum* discussion I made some few remarks which seem not to have been clearly understood by some of the Members present, and have been incorrectly reported in an "unauthorized statement" which subsequently appeared in a morning newspaper. I wish, therefore, to be permitted, on the present evening, to place on record my former statement, and also to explain my reasons for illustrating what I had to say by bringing forward the case of *Ceratopteris* and *Parkeria*.

First, it will be in the recollection of the President that I commenced by saying that, so far as my own personal experience of *Hymenophyllum Tunbridgensae* and *Wilsoni* in Ireland went, I fully agreed with the statements put forward by Mr. Andrews and Dr. Kinahan. I acknowledged that in this country these two ferns were readily distinguishable by characters of frond and involucre, and that I had never met with puzzlingly intermediate conditions of either; therefore, that, were I to limit myself to British specimens, I should probably admit the two species contended for. In doing so, I should be guided by the evidence before me; but the opinion thus formed, being based on evidence, considerable,—but far from complete or conclusive,—would be liable to modification as soon as any good evidence on the opposite side should be brought forward. In this, as in all other similar cases, I should adopt a species provisionally, not conclusively; and should be prepared to abandon it or uphold it, as the evidence might warrant. Having stated

so much, I went on to say (and I quoted a passage from Hooker's "*Species Filicum*" in corroboration) that other observers, who had studied these ferns in many widely separated countries and under various climates, had found the distinctions to be frequently less definitely marked than they are with us; that the involucre varied from being strongly and equally toothed, to being irregularly toothed or sub-entire; in short, that it put on characters intermediate between those attributed to *Tunbridgense* on the one part, or to *Wilsoni* on the other. And I held that if these statements be true, and they are supported by Dr. Joseph Hooker and Mr. Bentham, they were evidence which in my mind weakened the value of the previous evidence, and induced me, therefore, to question the specific distinction of these ferns. They lead me to expect that when more extended and more exact observations are made, even in this country, that intermediate forms of involucre will yet be discovered. And I would particularly recommend those who take an interest in this question to examine the involucre on a great number of fronds of both varieties, selected from plants growing side by side, as they often do, on the same rock, or mixed together, in the same patch—to make careful drawings of all variations in the involucreal teeth; and, above all, when the two occur in one patch, to ascertain that they do not occur on one rhizome.

I then remarked on the fact stated in the "*Species Filicum*," that both these ferns are found almost side by side in a great many distant countries, one frequenting moister and more shady, the other dry and more exposed situations, and that wherever one is found the other may be expected to occur; and from this I drew a conclusion unfavourable to their specific diversity—such a conclusion as that which would be drawn by most botanists, who regard geographical distribution as determining the distinction of species, if two closely allied forms present themselves. But if one is found only in the eastern, the other only in the western hemisphere, a botanist will be much more ready to accept them for distinct species than if both are found occurring constantly together, never far apart, not in one place only, but in fifty different and widely separated localities. The fact of their 'hunting in couples,' to a botanical mind, is suggestive of a closer relationship. I should have supposed that a zoologist would have taken a similar view; but Dr. Kinahan considers this multiplied proximity and constant association afford "an argument in favour of the distinctness of species," for "it is inconceivable," he says, "that the same modifying causes which influence vegetation could exist in all countries where these ferns are found." Now I believe that the great "modifying causes" which influence vegetation, namely, variations in heat, moisture, sunlight, and exposure to atmospheric changes, do exist, and proportionably too, as respects aspects, in all countries where plants grow. I also believe that some, at least, of the differences indicated between the two *Hymenophyllums* are just such as might be influenced by the "modifying causes" in question. The softer, more expanded leaves, and broader, more succulent involucre, and the freer growth of *H. Tunbridgense*, in-

dicating a plant of moist and sheltered places, while the rigid, contracted foliage, the compact involucre, and stunted growth of *H. Wilsoni* indicate a plant of exposed and dry rocks. Specimens, intermediate in luxuriance, according to exposure, are, no doubt, common, the Tunbridgensis becoming stunted, and the *Wilsoni* luxuriant, without a correspondent change in the character of involucre, which is regarded as the "specific" character. Hence the advocates of species maintain that juxtaposition, under the same climatal conditions, without conformity, is proof of specific distinctness. I cannot see how this can be maintained. If it were so, it might be argued that cauliflowers and cabbages are distinct species because they may be grown side by side, and are reproducible by seed from one generation to another; and so, of fifty other garden races which are to a great degree permanent, but which are well known to have had a common origin. They all grow side by side, unaffected by climate. So also the cowslip and primrose, two forms of *Primula* which differ from each other by far more obvious distinctions than the two *Hymenophyllums*, and which are equally constant to their particular characteristics and habitats. The primrose loves the shady or sheltered hedgebank or wood-side; the cowslip delights in open sunny meadows. They are found growing near each other, but seldom intermixed, and the characters which separate them are floral characters, and, therefore, technically of more importance than variation in foliage would be considered; and any botanist might appeal to his experience of their unchangeable characters, and produce a case of probabilities fully as strong as that adduced for the *Hymenophyllums*. And yet, after having travelled with a triumphant case from Fair Head to Cape Clear, we may find in the very last field at the point of Cape Clear a primrose passing into a polyanthus. This would materially shake his faith in one of his distinctive marks—the inflorescence; and if he also picked up an oxlip, he would find that the corolla was equally variable. Hence he may be led to suspect that the primrose, oxlip, and cowslip may be only permanent races, not species; and the fact of their occupying the same geographical area would not weaken his suspicions, but, as I still venture to think, would materially strengthen them. And we know that the progeny of both cowslips and primroses in cultivation become polyanthus; and there is high authority for the further statement that primrose, oxlip, and cowslip, have all been grown from the seed of a single plant. Therefore, whether in our books we hold them for species or not, in our inward convictions we regard them as permanent races only, growing true to the sub-type in ninety-nine cases out of a hundred, but sometimes breaking irregularly. Now, I would treat the *Hymenophyllums* similarly; as book species they are sufficiently constant in their characters to have the honour of trivial names; but, viewed philosophically, the probabilities are in favour of their being, like the primrose and cowslip, permanent varieties, rather than aboriginal species.

I am well aware that, were all plants thus treated, the number of book species would be enormously reduced. But, notwithstanding, I am

convinced that the reduction of species is a move in the right direction, and that we shall become used to it, and shall like it in time. As lobsters get used to being boiled, so species-makers will get used to being roasted. That Bentham has done good service in his Handbook in abolishing *Rubi*, *Salices*, and *Hieracia*, will, I think, be generally allowed, though the originators of the repudiated names may feel aggrieved; and if he have occasionally over-strained his point, I can forgive him, in gratitude for the good service he has done. But I have the more confidence in his judgment, and the greater respect for his authority, because I know him to be not merely a fair and truthful man, but a man of enlarged logical mind, of cautious discretion, and of acute observing powers, and who has had ample experience of plants both in the open field as well as in the closet.

I have still a few words to say in apology for my having brought *Ceratopteris* and *Parkeria* on the stage, as Mr. Andrews had considered my observations to have "no bearing on the point in discussion." To my mind they have a very definite bearing on an argument brought forward in Mr. Andrews's first paper. In that paper, when speaking of the specific distinctions between the *Hymenophyllums*, Mr. Andrews stated that the character on which he particularly relied was that taken from the involucre; and I understood him to maintain that in ferns generally, however variable the fronds might be, yet that characters derived from the fructification were subject to no variation, and were, therefore, certain characters. The inference he drew from this was, that as the *Hymenophyllums* differed by such a character, therefore they were distinct species—the point for which he was arguing. As I understood him to assert the absolute invariability of the fructification in ferns, I brought forward the case of *Parkeria* and *Ceratopteris* to show that instances of variability of a grave character do exist in the fructification of ferns. I stated that in *Ceratopteris* the elastic ring of the capsule varied considerably in size and development, and was sometimes quite obsolete; and I maintained that this character was one of graver moment than variations in the marginal serratures of an involucre.

When combating the inference I wished to draw from my statement, Dr. Kinahan, at the second meeting, when I was not present, is reported to have expressed himself thus:—"Every one who has studied the ferns living (for the mere closet study of dried specimens is but of comparatively little value) must know that, of all the characters selected as specific or genuine, the least valuable and most uncertain are those derived from the form, presence, and position of the transverse ring; indeed, I almost question the utility of these characters at all." This statement, I own, completely takes me by surprise. It is information as new to me as, I am convinced, it will be to most pteridologists. As far as I know, the facts I stated of *Ceratopteris* are quite exceptional; such variations of the ring are very unusual; and I still think the character of annulus entitled to be regarded, as it has been by Brown, Hooker, and all modern systematic writers, as a primary character, distinguishing not merely genera and species, but sub-orders among the

ferns. It is by a character of the annulus that Osmundaceæ and Schizæaceæ are distinguished from Polypodiaceæ, and, except by the annulus, Todea does not materially differ from Gymnogramma. But, leaving the annulus aside, instances in plenty may be adduced to show the variability of all the other characters of the fructification, viz., variations in the position, insertion, and shape of the sorus, and the presence or absence, form and insertion, of the involucre. In our common Harts-tongue the sorus is often found on the upper surface of the frond, showing that it varies in position. Such is the case occasionally in several other species, and in a Ceylon fern (*Polypodium anomalum*, Hook.) the sori are almost always found on the upper surface. This last-named species varies in a still more remarkable manner, its sori having sometimes a peltate involucre, and being sometimes quite naked, so that it has been described both as a *Polystichum* and a *Polypodium*. Similar instances of the inconstancy of involucres, especially in the genera *Polypodium*, *Polystichum*, and *Lastræa*, are not unfrequent among tropical ferns. "Lots of instances," Sir William Hooker writes to me, "might be given where an involucre is sometimes absent and sometimes present, in the same species of fern, and this all recent pteridologists bear witness to. On the same specimen I have seen laterally inserted and peltate involucres." That is, Sir William has seen a single frond which, technically, by its involucre, was partly a *Polystichum* and partly a *Lastræa*. And if involucres are found to vary in this wholesale way, can we be sure that they do not vary in the toothing and non-toothing of the margin? Their major characters do vary; are their minor characters immutable? But there is also a South African fern which is even yet more uncertain in its fructification, being sometimes a *Blechnum*, with a solitary medial sorus, and sometimes a *Scolopendrium*, with numerous divergent and opposite sori along the lateral nerves; and sometimes it is neither clearly one thing nor the other. Of this plant Sir William Hooker writes: "Look at your compatriot, the Cape *Blechnum punctulatum*, and if you have specimens from Dr. Atherstone, from Grahamstown, you may see the long sori breaking up and shooting off at right angles on each side the costa, working themselves along with the needful receptacular vein, arranging themselves in pairs, facing each other, and so forming *Scolopendrium Krebsii*. I can swear to this, and I only wonder others have not suspected it long ago."

After a case of irregularity like this, I do not think I need multiply instances to prove further that the characters of fructification, among ferns, as well as those of frond, are subject to extraordinary variation; and if Dr. Kinahan sets aside the annulus because of its uncertainty, I am entitled to set aside the sorus and involucre. But I am very far from advocating any such sweeping conclusion. The only point I desire to establish is this: seeing that in some ferns the annulus, sorus, and involucre do vary by their major or generic characters in the same species, it is not beyond the bounds of probability that they may also vary in their minor or specific characters. Therefore, if truthful and sharp-eyed witnesses, such as Mr. Bentham and Dr. Joseph Hooker, tell me that they have seen involucres on our *Hymenophyllums*, which are

intermediate in character between toothed and entire, I am disposed to believe them, without doubting Mr. Andrews and Dr. Kinahan's evidence, so far as it goes—the new evidence is not contradictory, but supplementary.

PROFESSOR KINAHAN said, that the meeting must congratulate itself on this discussion, since it had been the cause of the Society having been favoured with a written statement of Professor Harvey's views on this interesting question. He much regretted, however, that Professor Harvey had not been present at the last meeting, as he (Dr. Kinahan) found that the drift and application of the arguments adduced by himself on that occasion had been partially misunderstood by Professor Harvey, and the time already spent this night would prevent his opening them up again. To return to the argument brought forward to-night—the case of the primrose and cowslip appeared to be one in point. He was quite aware that primroses may turn into oxslips, even in a wild state, and might remind Professor Harvey of a specimen presented to him by himself, and which he had gathered in Professor Harvey's company, near Rush, last summer. Any one can, by cultivation, prove the point for himself, as in general two or three years' generous cultivation of the primrose is sufficient to cause it; but the cowslip he had been always led to doubt.* This case, therefore, fell under those in which what he had called their cultivation test applied, and, therefore, was excluded. Now, with regard to the cauliflower, which Dr. Wright denied was a monstrosity, had Dr. Wright ever tried the experiment? Dr. Kinahan had seen it tried, and the result had been the production of a *very bad* cabbage, no doubt, but nevertheless a cabbage. There were difficulties in the way of the experiment, for the cauliflower was a cabbage with a much weakened constitution, and one severe season might totally destroy the form to which cultivation had reduced it through three or four previous ones; but, nevertheless, under favourable circumstances the experiment may be carried out successfully; so that the cauliflower, after all, is only a domesticated plant, and, as such, excluded. With regard to the intermediate specimen, so triumphantly brought forward, he must be excused if he looked on it with great suspicion. It had been identified only by parties having a theory to support; and, without meaning or intending any disrespect to them, or doubt of their botanical skill—the latter of which would be preposterous—he must look on their reading of the specimen as a prejudiced judgment. The locality in which it had occurred strengthened him in this opinion; not in Great Britain, nor even Europe, neither in Asia, Africa, nor America, but at the very Antipodes, in the wilds of Australia it appeared that we must seek for the real proof of the distinctness or unity of the forms. Dr. Kinahan strongly suspected that, to use the words of one of the most philosophical biologists of the present age, in this case an error had been committed, and similarity mistaken for identity, and two representative forms confounded.

* Experiments subsequent to the above remarks prove to me that it does occur.—
J. R. K.

DR. E. PERCEVAL WRIGHT remarked that Dr. Kinahan had said nothing about the herbarium specimens exhibiting variations in the toothing of the involucre.

DR. KINAHAN intended these to be included under his remarks concerning the intermediate Australian specimen; a personal examination of them might lead him to very different conclusions as to their species from Dr. Wright's.

§ The PRESIDENT rose, and said that he should offer but few remarks, as he had given so fully his views upon the distinctive characters of the two ferns in his papers at the previous meetings, and that recapitulation was not again necessary. He should confine his observations to the fern family. He was well aware that specimens of *Hymenophyllum Tunbridgensis* are in the Hookerian Herbarium from the Oregon Mountains and from Tasmania, and described in the "Species Filicum" as having the involucre nearly entire, and scarcely distinguishable from those of *H. Wilsoni*; yet so little dependence can be placed on the examination of specimens collected at remote periods, and which are only seen in a dried and shrivelled condition, that the authority of such specimens as to the passage into intermediate states can have but small pretensions in setting aside the distinctive forms shown in all gradations of growth and of fructification by our British species. Botanists have had ample experience of the difficulties of retaining in their collections the true state of the original and recent form of a plant where the essential characters of the recent state are so fugacious as to be altogether lost in Herbaria. On reference to specimens of *Hymenophyllum Tunbridgensis*, many years since collected, and but imperfectly dried in bad paper, the fronds have so lost their colour, and the involucre, from undue compression, and perhaps the careless shifting of papers, that they present but faint outlines of their true habit and distinction. Thus contracted involucre and almost obliterated serrations abound, or spinulose characteristics alter and deceive the examination. In some cases the imperfect state or development of the fertile venules may lead to many misconceptions of the character of a genus, more especially when the true manner in which the sporangia are produced cannot be detected. In the examination of the plants of an herbarium, with reference to the inconstancy of fructification as a determinate characteristic, such views cannot as a general principle be maintained, for the specimens in an herbarium, from imperfect development when collected, or from the process of drying, may not present their determinate characteristics, as we see in the genus *Pleocnemia*, which had been considered, from the apparent absence of a special indusium, to have been a *Polypodium*; but the examination of a perfect specimen had determined its character as belonging to *Aspidiæ*. The fugacious character of the indusium, and its disappearance in advanced age or mature state of the plant, have too frequently caused plants to be described as belonging to *Polypodiæ*, when they are really true *Aspidiæ*. Mr. J. Smith, of the Royal Botanic Garden, Kew, who has given many highly scientific and valuable notes on the genera of ferns, has, by a systematic examination of their states under cultivation, as well as from careful comparisons of collections made in different parts

of the globe, proved many errors existing among the named specimens of collectors, as is strikingly shown in the genus *Stenosemia*. In Sir William J. Hooker's herbarium, the most extensive in the world, there still must exist many doubts as to true generic characters and specific distinctions and affinities, from the want of examination of recent specimens. Then, upon what grounds are the distinctive characters of the specific forms of *Hymenophyllum Tunbridgense* and *H. Wilsoni* to be set aside? Upon mere assertion, and upon the appearance presented by some dried specimens from Australia of *H. Tunbridgense*, of having the involucre nearly entire. Perfect and recent plants of both species of this country have been exhibited to this meeting. Where are the specimens in contradiction, and which are to support the views of those who maintain the unity of the species? The two species are admitted as perfectly distinct by the highest scientific as well as the most practical British botanists, and no departure can be shown from the characters hitherto described of those species in any locality in the British Isles and in this country. Then, why introduce such confusion into British Botany? It is not upon the authority of even Continental or European specimens, but upon those from Australia. When doubts exist, the forms even in exotic herbaria should not be admitted until satisfactorily proved by examination in the recent state, and of aspect under cultivation. In conclusion, I shall not mention the names of several scientific botanists and experienced travellers who have communicated with me in corroboration of my views. It is quite sufficient to give the name of one whose high scientific position, whose valuable writings, and whose extensive practical observations place his authority unquestionable,—Sir William Jackson Hooker,—whose letter I now lay before you:—

“*Royal Gardens, Kew, April 18, 1859.*

“MY DEAR MR. ANDREWS,—Many thanks for your interesting communication respecting the two *Hymenophylla—Tunbridgense* and *Wilsoni*—and still more for the charming patches of the two plants, which are very acceptable to our Garden,—and which, I must honestly confess, confirm my views, which I have, I believe, invariably expressed, that our two plants are *perfectly* distinct. It is true the fronds are very similar, but I find such characters in the *involucre*, and they afford the most tangible characters throughout the genus, that I cannot fancy the one passing into the other—the texture of the *involucre*, the form of the valves always firmer, thicker, and more gibbous (almost semi-globose); in *H. Wilsoni* the direction of the involucre is different. In *H. Tunbridgense* it lies in the same plane with the fronds; in *H. Wilsoni* it is less sessile, and diverges with a curvature *from* the frond (as well represented in “English Botany,” Supplement Table, 2686: compare with *H. Tunbridgense*, “English Botany,” t. 162). Again, though *H. Wilsoni* has the valves of the involucre of a firmer texture, when they expand in age they are *more convex* in form, the sides turning up more, so that the valves almost become semi-cylindrical. In *H. Tunbridgense* the texture of the valves is scarcely different from that of the frond, yet they retain in age, and when expanded, more of their original flattened or

slightly convex form. Now, when I see such characters invariably accompanied in the one case with *entire* margins, in the other with deeply *serrated* or almost *spinulose* ones, I cannot do otherwise but look upon them as distinct as any two ferns can well be. I certainly remember the time, years and years ago, when I hesitated, till I found on one and the same rock in Argyleshire copious specimens of the two in great tufts, but each retaining its own characters, and exhibiting nothing intermediate. It is quite true I have expressed doubts and difficulties with respect to exotic specimens referred to the two; but then we have not the advantage of consulting recent specimens, or even good specimens of those. Most botanists consider them distinct (the Wilsoni) from ours. I cannot give up our British original ones. Prest places them in two distinct sections, from the different *nature* of the involucre; but that is carrying the distinction too far.

“Very faithfully yours,

“W. J. HOOKER.”

The HON. SECRETARY read the following—

NOTES ON FRESH-WATER MOLLUSCA IN THE NEIGHBOURHOOD OF ENNIS, AND THE RELATION BETWEEN THOSE NOW LIVING THERE IN THE LAKES, AND THOSE FOSSILIZED IN THE MARL, WITH OBSERVATIONS ON THE ACCIDENTAL PRESENCE OF A MARINE SPECIES. BY FREDERICK J. FOOT, G. S. I., CORRESPONDING MEMBER.

ABOUT three miles to the north of Ennis, and less than a mile north-east of Ballyallia demesne, are situated several small loughs, abounding in molluscs. These lakes communicate with one another by small streams, and thus form a serpentine continuous chain. Formerly, after heavy rains, the water used to rise to a considerable height, and flood the neighbouring lands; but of late years the works of the Drainage Commission have prevented this, and have also considerably reduced the little loughs in size, so that a broad margin, three or four feet wide, of what was formerly their bottom or bed, is now dry, and covered by numbers of dead shells, the same as those seen living through the clear waters of the lake. The most typical example of this phenomenon is seen at a small pool called Licknaun Lough. Here myriads of shells are found surrounding the scaly roots of the white and yellow water-lilies, which spread themselves extensively over the dried-up surface and bed of the lake. Specimens of these shells may be seen on the table. The following is a list of them. I am indebted to my friend, Mr. W. H. Bailey, of the Geological Survey, for their identification:—*Limnea stagnalis*, *L. pereger*, *Bithynia tentaculata*, *Succinea putris*, *Planorbis marginatus*, *Neritina fluviatilis*, *Valvata piscinalis*, *Anodonta cygnea*, *Cyclas cornea*. The same species are also found by digging into this dried margin. A marine species, the common periwinkle (*Littorina littorea*), may be also gathered here in abundance. The presence of these, which at first somewhat puzzled me, as these lakes are more than a mile from the Fergus, and that river is only tidal to Ennis Mill, a point more than three miles from the lake, is, I find, accidental, and due to the habit of the inhabit-

ants of the surrounding districts, who come to fish here on Sundays, and regale themselves during their stay on periwinkles procured at the neighbouring town. The bed of the lake is a muddy diluvium, full of all the above-named species, the periwinkle excepted. The commonest are—*L. pereger*, abundant; *L. stagnalis*, abundant; *Planorbis marginatus*, abundant; *Valvata piscinalis*, local; *Bithynia tentaculata*, abundant; *Cyclas cornea*, abundant; *Anodonta cygnea*, scarce, apparently wanting in base of bed. The others enumerated before seem scarce. This diluvium is partly made up of stones and fragments of woody plants and grasses, so much so as in places to give it a peaty appearance; bones of quadrupeds and birds also occur in this.

Beneath this deposit (the maximum thickness of which may be about four feet) is a bed of marl, composed of shells identically the same as those imbedded in the surface-soil, and yet living in the lake. The species are not nearly so numerous. The following are the only ones I could discover in the marl:—*L. pereger*, which may be called the basis of the marl, as not a cubic inch can be examined without finding this shell, either whole or in fragments. *L. stagnalis* and *Bithynia tentaculata* range next in abundance; then *Valvata piscinalis*, *Planorbis marginatus*, and *Cyclas cornea*, both of which are locally abundant. There does not appear to be a trace of any of the other above-mentioned species. The marl is also full of vegetable remains, such as twigs and leaves of trees and grasses. It is of a buff colour, and is highly calcareous, effervescing freely with acids.

At Licknaun Lough the marl lies in denuded basins or troughs of the limestone drift (sometimes resting immediately on the adjacent rock), and a large boulder frequently interferes with the continuity of the deposit. The pockets in which the marl occurs are local. The accompanying rough sections, which are only an approximation, not being drawn to scale, will give an idea of how the marl lies, and of the present appearance of the lake. The greatest visible thickness of this bed is about three feet, but it probably attains to much more than this. If the margin of the lake should ever become submerged and converted into a geologic strata, the marine species occurring there might lead to much confusion, and the history of the cause of their occurrence shows the danger of theorizing on the mere presence of marine species inland without careful inquiries as to the cause of their occurrence. To the east of Ennis, near the town, the marl is covered by from four to six feet of bog, and further east, in the neighbourhood of Quin, and south thereof, it occurs in several places beneath either bog or alluvium. The shells found here are the same as those in the marl at Licknaun Lough.

The ballot having been opened, the following gentlemen were declared duly elected:—

Ordinary Member:—Henry Thomas Vickers, Esq., 81, Lower Leeson-street.

Corresponding Member:—Robert Warren, Esq., Ballina.

The Meeting then adjourned to the 3rd of June.

FRIDAY EVENING, JUNE 3, 1859.

WILLIAM ANDREWS, M. R. I. A., President, in the Chair.

THE Minutes of the previous Meeting having been confirmed, were signed.

The following were presented to the Society:—An egg of the Peregrine falcon (*F. peregrinus*), and a Pine Marten (*Martes Foina*), from Robert J. Montgomery, Esq. The egg of the Peregrine is from an island on the coast of Donegal, where the falcon is universally known by the name of Tory Hawk. The Peregrine is daily becoming more rare, on account of the murderous system of poisoning. The same applies to the Marten, an animal which in the north is only known by the Irish name of “Madhia crann” (tree dog).

Professor KINAHAN, F. L. S., read the following paper—

ON THE GENUS *RANICEPS*, AND THE OCCURRENCE OF THE TADPOLE-FISH
(*R. TRIFURCATUS*) IN DUBLIN BAY.

FOR the opportunity of being able to lay before your Society an account of the occurrence of this rarely observed British fish, I am indebted to the kindness of D. J. Corrigan, M. D., M. R. I. A., by whom the subject of this communication was captured in Dalkey Sound, in a wire lobster-pot, about three weeks ago, and in whose vivarium the specimen has lived ever since, thus affording an opportunity of studying the habits of the fish, a thing long desired by naturalists.

Two records only of this fish as Irish are published, viz., one by the late William Thompson, of a specimen given him by Captain Fayrer, who picked it up dead, floating, near Donaghadee, in 1837; the other by our respected President, William Andrews, Esq., who procured a specimen in Dingle Harbour, in January, 1852, which had been captured on a long line set for cod-fish; so that we have now this fish recorded on the east, north, and west of the island. This agrees with what is known of its distribution in Great Britain, as it has been met with at Berwick, Firth of Forth, Solway Firth, coast of Northumberland, Cornwall, and the west coast of Scotland. It is to be looked on as rather a fish which comes rarely under notice than as either a rare or restricted species.

The best figure and description of it published are those given by Dr. Parnell in his Contributions to the Ichthyology of the Firth of Forth, given in the second volume of the “Magazine of Zoology and Botany,” page 344, the only errors in which are the rendering of the ventral fins, which are represented rather obscurely, and the length of the posterior dorsal, which in Dr. Corrigan’s specimen approaches nearer to the tail than is shown in the figure. The head also is scarcely depressed enough. The figure in Yarrell’s first edition, from the pencil of Mr. Couch, is also characteristic. There appears to be some difficulty as to the exact

position of the genus. At present it is placed among the Gadi, but probably Dr. Parnell's suggestion that it belongs to a separate family is correct, as, although it possesses affinities to the Hake's dame (which fish has also occurred off the Dublin coast), yet, at the same time, it is very distinct from that genus. In many of its external characters it presents analogies with the Fishing-frog; but the nature of its fins will not allow it to be placed even in the same subdivision as that fish. Its habits, as far as I could observe them, are very curious. The ventral fins, which are far in advance of the pectorals, are furnished with two long and somewhat stiff rays, which project considerably: these are capable of motion independently of each other and the other rays of the fin, and by means of them the animal progresses along the bottom of the tank in which it is kept. The pectorals, which are large and rounded, possess great mobility at the wrist-joint, the animal rotating them at times nearly completely round. The anterior dorsal fin, concerning which there is some discrepancy in the descriptions, is correctly represented in Dr. Parnell's plate. The barbule under the chin appears to be under the control of the will of the animal, as Dr. Corrigan informs me that at times it is scarcely visible, at other times it is appreciable enough. The caudal fin is damaged in the Dalkey specimen, but appears to have been rounded. The fish is remarkably slimy to the touch, neither scales nor lateral tubercles being appreciable either to touch or sight. The true nature of the anterior dorsal fin is difficult to make out; but I could not find any trace of the groove said to exist for its reception. The head is remarkably depressed, the eyes prominent on the top of the head, and of a yellow colour; the general colour of the fish is a deep purplish black, of a very peculiar shade. Since it has been in confinement it feeds greedily on the insides of crabs, &c. It is, when it likes, a very active fish, and, on account of its slippery coating, difficult of capture by the hand. These observations are all drawn up from the living fish, and a fear of injuring the specimen prevented my examining some points as closely as I could wish. Its occurrence in Dalkey Sound is highly interesting. I have before had occasion to call the attention of the Society to the occurrence there of many deep-water species of Crustacea, and have little doubt that, to an attentive observer, many other rare species will occur within this strait.

The President considered the notice of the occurrence of the Tadpole-fish one of great interest. The only specimen he had ever seen was captured on a spiliard line in Dingle Bay, in thirty fathoms water. He quite agreed with Professor Kinahan's remarks concerning the fish, which was a deep-sea species, and a ground-feeder. When received, the Dingle specimen was a deep violet colour, which after death turned to an intense black. This specimen might be seen at the Royal Dublin Society House. The mode of feeding in this fish and the Fishing-frog being the same, it was easy to account for the similarity in appearance between the two. The Society ought to be much obliged to Dr. Corrigan for the notice of this rare fish.

MR. W. ARCHER read the following—

DESCRIPTION OF TWO NEW SPECIES OF STAUROSTRUM.

IN these days of cancelling from our lists, and their consolidation with others, of numerous species, or reputed species, in the various walks of Natural History,—and this, no doubt, in many cases, with much reason,—it may appear unjustifiable rashness and temerity on my part to come forward for the purpose of describing the following two new forms to be added to our lists of Desmidiaceæ. But in a more extended point of view, in regard to what is a species and what is not, it seems to me that naturalists are prone to err in one of two directions: they either restrict the number of species in their lists within too narrow limits, or inordinately increase their number by giving a name and specific rank to almost every variation which they encounter. On the one hand, because, between two hitherto recognised distinct, but allied species, there are occasionally found forms, as it were intermediate, connecting them, it is assumed that these two original forms must necessarily make but one species. On the other hand, those naturalists might possibly be not wanting who would feel inclined to consider not only the two original, but also one or several of those intermediate forms, as themselves species. Both extremes, as it seems to me, may be wrong. Might it not be expected to be the case that the limits of variation of each of the two original species, so nearly allied, might, so to speak, so touch each other at the margin, as to seem to unite them together, and give rise to the assumption, always plausible, but perhaps not always correct, that one of the original species could (and does), by a series of transitions, pass into the other? If any one species become modified, is it not to be expected that the characters of the most nearly allied form, and not those of one remote in affinity, will be those which, to a greater or less degree, it will be likely to simulate? Under this hypothesis, the two original forms would still justly be considered true and distinct species—in contradiction to the opinion of the former class of naturalists—while the forms intermediate would be but variations (perhaps but of a temporary or local nature), some derived from one species, some perhaps from the other, and could by no means be looked upon as true species—in opposition to the views of the latter class of naturalists. I do not mean to intimate, when a hitherto acknowledged species is rejected, that I imagine the step always to be an erroneous one, for he who successfully demolishes the spurious claims of a mere book-species does Science a good service; but it seems to me that what I have tried to express is a state of things, the possibility of the existence of which, by those who are anxious to suppress species, may sometimes be lost sight of or ignored.

There can be no doubt, however (and especially amongst microscopic forms), that our lists are more or less incumbered with the redundant names of false species, which further research will doubtless eventually prove. Many forms which now pass under distinct names may hereafter be found not worthy to take specific rank in our systems. And here it is that the difficulty lies. In order to prove the identity of two reputed species, over which there hangs a doubt, not only must the

happy opportunity be afforded of tracing the organism through its whole course of life, but, on the part of the observer, the requisite leisure and patient assiduity must not be wanting.

No doubt it is much easier to describe a new species than to demonstrate that two, or perhaps more, familiar forms are but different states or phases of one and the same organism. Nevertheless, when a form undescribed and quite distinct from any of its nearest allies in the same genus, and distinguished by marks as decided and striking as those by which species, which are universally acknowledged, are separated, presents itself occasionally, perhaps abundantly, and which may as likely be met with by other observers, it seems to me right, nay essential, that it should be distinguished by a name, and its diagnostic characteristics carefully recorded.

I offer the foregoing remarks, which it may be proper to state were written considerably before the Hymenophyllum discussion arose, as apologetic for my venturing to bring forward the following description of two species of *Staurostrum*; and yet, perhaps, they are not strictly applicable, for these new forms appear to me abundantly distinct from every other species, and in no way to be mistaken for mere intermediate or gradational variations. To some, however, it may seem premature to describe them without knowing the sporangial state. It will be recollected, however, that, of very many of the species, as described in Ralfs' "British Desmidiæ," the sporangium is not known, nor, when known, can there usually be important distinctions drawn from it. I trust the following may serve as a description of the new forms:—

Family.—DESMIDIACEÆ.

Genus.—*STAUROSTRUM* (*Meyen, Bréb., Ralfs, &c.*).

Staurostrum oxyacantha (*sp. nov.*).

Specific characters: Frond rough with minute granules; segments broadly fusiform, with incurved processes; end-view tri-radiate, each side having, disposed at equal distances, a pair of depressed, slender, subulate, acute spines.

Locality: Pools near "Sugar-loaf" Mountain, on the Roundwood road; rare.

General Description: Frond nearly as long as broad; segments rough with minute granules, broadly fusiform, inner margin somewhat more turgid than the outer, and forming at constriction a broadly triangular notch, tapering at each side into a colourless process incurved or converging with that of the opposite segment, having the granules thereon arranged in transverse lines, and cleft at the extremity into three or four minute subulate spines; frond furnished at ends upon each side with a pair of slender subulate, acute, depressed spines, which are apparent in the front view. End-view tri-radiate, having projecting from each side at equal intervals the parallel pair of spines unaccompanied by others; processes terminating each angle in this view, straight, elongate; endochrome restricted to the centre, tri-radiate.

Length of frond, 1-770 of an inch; breadth, 1-580 to 1-636; breadth of constriction, 1-2330.

Plate I. Fig. 1, front view; Fig. 2, end view.

This form appears to me very distinct from any described. The presence of the conspicuous pair of acute spines projecting from each margin at end-view distinguishes it from all but *Staurastrum vestitum*, but in that species the spines, which are apparent only in the end-view, are emarginate at the ends, and often accompanied by others of considerable size; and indeed, even the smaller are themselves often emarginate; moreover, in the front-view it differs by its converging process. It is also considerably smaller than *Staurastrum vestitum*, being not more than half its width, which diameter in that species greatly exceeds its length. The converging processes in front-view are somewhat like those of *S. cyrtocentrum*; but in that species there are no spines at the ends of the fronds, and the processes in end-view are not so much prolonged, and are curved in place of straight. The presence of the marginal spines in end-view, and the incurved, not divergent or parallel processes in the front-view, distinguish this from *S. paradoxum*, *S. gracile*, and *S. polymorphum*.

Staurastrum nitidum (sp. nov.).

Specific characters: Frond rough at the ends, with a series of papilla-like granules; segments broadly elliptic; end-view triangular; sides convex, with a sub-marginal series of papillæ; angles not inflated, mucronate.

Locality: Pools near "Sugar-loaf," rare.

General description: Fronds about as broad as long; segments broadly elliptic, inner margin somewhat more turgid than the outer, sub-mamillate at each side, terminated by a mucro, and on the outer margin rough with a series of minute papillæ, otherwise smooth; constriction forming a broad notch, with an acute angle; end-view triangular, sides convex, with an inwardly curved sub-marginal series of papillæ, their summits directed somewhat towards the angles; angles not inflated, the last papilla forming a terminal mucro; endochrome in both views disposed in a radiate manner; gelatinous investment evident.

Length of frond, 1-540 to 1-535; breadth of frond, 1-540; breadth at constriction, 1-1160 of an inch.

Plate I. Fig. 3, front view; Fig. 4, end view.

This, although not a complex form, owing to its brilliant and beautifully radiately-disposed endochrome (in front-view almost in fillets), is an extremely pretty species. In end-view its non-inflated mucronate angles and series of papillæ distinguish it, I think, from every other *Staurastrum*. In front-view it somewhat resembles *S. asperum* (Bréb.) *a*, but the minute spines on the outer margin, in that species, are usually emarginate or cleft at the ends, or dilated, and the segments are not mucronate at each angle, nor is the endochrome radiately disposed. In the form in question, the convex sides, mucronate angles in end-view, and granules not scattered, distinguish it from *S. punctulatum*. I do not think I need contrast it with any other species, and I believe that both the foregoing forms have only to be seen, when their perfect distinctness would be at once apparent.

Mr. W. ARCHER, Secretary, next read the following paper—

ON A NEW GENUS AND SPECIES IN THE DESMIDIACEÆ; WITH SOME REMARKS ON THE ARRANGEMENT OF THE GENERA AND SPECIES OF MICRASTERIAS AND EUASTRUM. BY THE REV. R. V. DIXON, A. M., EX-F. T. C. D., CLOGHERNEY RECTORY, DUNGANNON.

I BEG leave to submit to the notice of your Society the following account of a form of Desmid, which I have lately met with in this neighbourhood, and which I believe has not hitherto been described. The frond, as represented in Plate I., Figs. 5-7, is simple, compressed, with a deep and acute gaping constriction between its segments, which are three-lobed, the line separating the extreme from the basal lobes being parallel to the line of separation of the segments. It has no inflation on its surface, but exhibits on its margin a few mucronate spines. This form appears to me to be generically distinct from both *Micrasterias* and *Euastrum*: from the former in the direction of the separation of its lobes, from the latter in the absence of inflations. In these characteristics it agrees with *Micrasterias oscitans*, and *M. pinnatifida* (Ralfs) as well as with the form *Holocystis oscitans* (Hassall), described by Dr. Hassall, and referred to by Mr. Ralfs ("British Desmidiæ," pp. 69-77), and it is worth considering whether these forms should not be all grouped together in a new genus. Before proceeding, however, to give the complete description of this proposed genus and the three species which it would contain, I beg leave to offer a few remarks on the different manner in which the segments are divided in those Desmids which have lobed or divided segments, and which for this reason I take the liberty of calling *Schizomerous* Desmids.

The typical mode of division (as exemplified in *Euastrum pinnatum*, *E. oblongum*, &c.) appears to be into three portions or subdivisions: the first, next the line of separation of the segments, extending across the frond, and embracing the two basal lobes; the second, including the median lobes; and the third, the extreme or end lobe. This last, or third subdivision, is the most constant. The two former are frequently represented by a mere sinuosity or shallow indentation where the third is distinctly developed, but we never find the first subdivision distinct, and the second and third imperfectly separated. The whole three, indeed, may be merely marked by slight sinuosities, as in *Euastrum cuneatum*, but if any one is separated, it is the third, and this, I may observe, is the order of development of the subdivisions in the growing segment of the typical *Micrasterias*. The new segment is first hemispherical; the third subdivision is then developed; and afterwards the first and second are separated.

For the purposes of description these three subdivisions might be denoted by the letters *a*, *b*, *c*, and their partial or complete development marked as follows:—When the subdivisions are distinctly separated, their symbols might be separated by commas, thus, *a*, *b*, *c*; when any two or more are merely marked by a sinuosity, they might be represented thus, *a*~*b*; and if there is no trace of separation, thus, *ab*; and if, at the same time, the direction of the lines separating the subdivi-

sions were noted, the full description as regards the divisions of the segments would be given. Thus—

<i>Euastrum cuneatum</i>	would be represented by	$a \frown b \frown c$.
<i>Euastrum pinnatum</i> ,	„	„ a, b, c , parallel.
<i>Euastrum oblongum</i> ,	„	„ a, b, c , subradial.
<i>Micrasterias denticulata</i> ,	„	„ a, b, c , radial.
<i>Euastrum pectinatum</i> ,	„	„ $a \frown b, c$, parallel.
And our new form,	„	„ ab, c , parallel.

The direction of the lines of separation of the subdivisions in the Schizomerous Desmids varies from parallelism to true radiation, and at the same time the intervals between the subdivisions close, so that in *Micrasterias denticulata*, *rotata*, and *fimbriata*, the frond appears almost entire with radial lines on its surface. I think regard ought to be had to this characteristic in placing the genera and species of *Euastrum* and *Micrasterias* between the filamentous forms on the one hand and the *Cosmaria* on the other; that the forms with parallel subdivisions should come first; the *Euastra*, so well marked by their peculiar inflations, a few of which are parallel, but the majority subradial, next; and the *Micrasterias* last, terminating with the radial closed species, from which the transition will be easy to the *Cosmaria*, among which traces of radiation still appear in the endochrome of *C. Ralfsii*, in the ridged surface of *C. undulatum*, and the crenated margin of other species. The whole group of Schizomerous Desmids then might be distributed among three genera—the first containing *M. oscitans*, *M. pinnatifida* (*Ralfs*), *Holocystis oscitans* (*Hasall*)—if this be distinct from *M. oscitans*, which appears doubtful—and our new form; the next being *Euastrum*, and the last *Micrasterias*. In conclusion, I beg to mention that I owe the drawing which accompanies this paper to the kindness of Mr. Archer, whom I consulted when I first met with the new form under discussion, and to whom I forwarded the gathering in which it occurred for further examination; and that the following detailed generic and specific descriptions have been drawn up by the same gentleman.

Family.—DESMIDIACEÆ.

TETRACHASTRUM (*gen. nov.*)*

Generic Characters: Frond simple, compressed, deeply divided into two three-lobed segments; the basal lobes projecting horizontally, broadest within and attenuated outwards; end-lobe expanded into two lateral attenuated projections parallel in their direction with the basal

* From *τέτραχα*, in four parts, in reference to the fourfold division of the fronds, which is most conspicuous in *T. oscitans* and *T. pinnatifidum*, and *ἀστρον*, a star. This latter term, in its usual sense of a radiate form, is not a descriptive one, as applied to our new genus; but I adopt it because it occurs in the names of the other two genera of the same group, and I wish to mark their mutual affinity. Moreover, the term *ἀστρον* is not more inapplicable, on this ground, to the fronds of the proposed genus than it is to those of several species of *Euastra*,—*E. cuneatum*, &c., for instance.—R. V. D.

lobes; ends straight, or convex, or having at the middle of the rounded ends a very slight concavity.

General Generic Description: The fronds are simple, as long as or longer than broad, compressed, without inflations, deeply divided into two segments by a constriction, forming a broad acute-angled notch; each segment constricted by a broad notch or sinuosity upon each side into two *subdivisions* forming three lobes, the basal lobes broadest within and attenuated outwards, not radial, but extending horizontally and parallel in their direction with those of the opposite segment; the end-lobe expanded laterally into two attenuated projections, which are horizontally disposed and parallel in their direction with that of basal lobes, so that the entire frond is of a pinnatifid character; the ends of the fronds convex, straight, or having at the middle a very slight concavity or depression, not emarginate.

Tetrachastrum mucronatum (sp. nov.).

Specific Characters: Frond longer than broad; ends rounded, having a slight central concavity; end lobe having its lateral projections terminated by a mucro; basal lobes broadly and bluntly triangular, having at their margin at each side either one, two, or three minute mucro-like spines; empty frond punctate, the puncta scattered.

Symbol: *ab, c*, parallel (*vide supra*).

Locality: Bog near Carrickmore, Co. Tyrone.

Measurement: Length of frond, $1\frac{1}{8}$; greatest width, $\frac{1}{2}\frac{1}{3}$; width of neck, $\frac{1}{3}\frac{1}{3}$; diameter at constriction, $\frac{1}{8}\frac{1}{8}$; greatest depth, $\frac{1}{4}\frac{1}{8}$ of an inch.

Plate I.—Fig. 5, front view with endochrome; Fig. 6, empty frond; Fig. 7, outline of side view; Fig. 8, outline of transverse view.

General Description: The frond in this species is large, smooth, entire, about one-fourth longer than broad; in the front-view divided into two segments by a deep constriction forming an acute-angled, straight-sided notch, not linear, but broadest at the outside. The segments are constricted about two-thirds of the way from the base by a rounded sinuosity, causing the basal lobes to be of a bluntly triangular outline, straight on the lower, turgid or convex on the upper margin, and furnished thereon with one, two, or three minute mucro-like spines, one always at each basal angle. The basal lobes slope upwards to form a broad neck, uniting the terminal lobe to the basal portion: supposing the end to be *absent*, the frond would be orbicular. The lateral projections of the end-lobe have their extremities tipped by a mucro, and somewhat projected downwards. Ends of the fronds convex with a *gentle* central concavity. In the side-view the frond is smooth, about four times longer than its greatest depth; the central constriction is rather deep; the segments in this view ovate, turgid near the constriction, somewhat tapered towards the ends, which are rounded. The transverse view is broadly fusiform; the endochrome rich green, with scattered granules. The empty frond is punctate, the puncta scattered.

By attention to the generic characters as given above, this species can of course be readily distinguished from every other Desmidian, *Micrasterias oscitans* (Ralfs) and *M. pinnatifida* (Ralfs) excepted. The presence of the marginal mucronate spines and of those terminating the lateral projections of the end lobe, combined with the absence of the incised extremities, as well as the frond being longer than broad, at once distinguish this from both those species, which, as a matter of course, I here include in this genus. It may be advisable here to transcribe from "The British Desmidiæ" (pages 76, 77) the specific characters of those two species, the first under the name of—

Tetrachastrum oscitans = *Mic. oscitans* (Rfs.), *Holocystis oscitans* (Hassall).

"Frond with convex ends [segments constricted], lobes [horizontal] conical, bidentate."

The characters here placed between brackets become generic by transferring this species to this new genus, but as it was included in *Micrasterias* by Ralfs, they were necessarily introduced as specific distinctions from the proper species of that genus. From the remarks in the preceding part of this paper on the new genus, it will, I hope, be admitted that they are really generic. In order to distinguish this species from *Tetrachastrum mucronatum*, they are not requisite, as the bidentate extremities to the lobes, with the absence of the mucros, and the frond being nearly about as broad as long, readily do so.

The remaining species will be—

Tetrachastrum pinnatifidum = *Micrasterias pinnatifida* (Ralfs).

"Frond plane, its ends straight [segments deeply constricted], lobes [horizontal] triangular, bidentate."

The same characters which distinguish the preceding species from *Tetrachastrum mucronatum* also separate this, which is moreover much smaller. It appears to differ from the preceding by its much smaller size, straight or slightly concave ends, more tapering lobes, and paler colour.

There can be no doubt, it is imagined, that the view taken above is correct in defining this genus as three-lobed, that is, with two basal lobes and a laterally expanded terminal lobe, and not four-lobed, that is, counting the lateral projections of the end lobe as two, which would involve the necessity of describing these forms as truncate, and without a terminal lobe. The end lobe in these forms is equivalent to the same portion in *Micrasterias rotata* or *M. Crux-Melitensis*, and differs by having more extended lateral projections not divergent, but, as above described, projecting horizontally and parallel in direction with the attenuated basal lobes.

The following synopsis of the Schizomerous Desmidian genera, and of the species of *Tetrachastrum* will, it is hoped, assist in conveying,

in a succinct manner, the views put forward above, as well as the end sought to be accomplished in the present paper by the institution of the genus.

Fronde simple, compressée, profondément constricte, segments lobés ou sinués (Schizomerous); lobes either incised, sinuate, or entire.

Fronde lenticular, as long as or longer than broad; segments usually semi-orbicular, five or rarely three-lobed (with three, or rarely two subdivisions, a, b, c , or $a \frown b, c$); lobes radiant, incised or dentate, rarely only sinuate, widening outwards; central constriction usually linear. *Micrasterias*.

(*Vide* "Brit. Desmidiæ," p. 68, *et seq.*)

Fronde longer than broad; segments more or less conical, five or three-lobed, or sinuated (with three or two subdivisions, either a, b, c , or $a \frown b, c$, or ab, c , or rarely $ab \frown c$), possessing variously disposed, circular, inflated prominences; ends emarginate, or rarely with merely a concavity; central constriction linear. *Euastrum*.

(*Vide* "Brit. Desmidiæ," p. 78, *et seq.*)

Fronde about as long as or longer than broad; segments three-lobed (with two subdivisions ab, c), without inflated prominences; basal lobes horizontal, attenuated outwards, end lobe expanded laterally, its lateral projections parallel in direction with the basal lobes; ends straight or rounded, entire; central constriction forming an acute-angled spreading notch:—

Tetrachastrum.

Fronde longer than broad; segments constricted about two-thirds of the way from the base; lobes mucronate, their extremities not bidentate. *mucronatum*.

Fronde as broad as or slightly broader than long; segments constricted about half-way from the base; lobes not mucronate, their extremities bidentate.

Fronde with convex ends; lobes conical; colour rich green. *oscitans*.

Fronde with straight ends, plane; lobes triangular; colour pale. *pinnatifidum*.

Mr. Sanders having expressed the pleasure he had experienced in listening to the foregoing paper, proposed a vote of thanks to the Rev. R. V. Dixon for his interesting communication, which was seconded by Mr. Archer, and passed unanimously.

The following paper was directed to be printed in the "Proceedings," the lateness of the hour having prevented its perusal:—

NOTICE OF SOME CASES OF ABNORMAL GROWTH IN THE DESMIDIACEÆ.
BY WILLIAM ARCHER.

It has occurred to me that the accompanying sketches, representing an abnormal mode of growth in the Desmidiaceæ, exhibiting, as they do, an appearance so curious and unusual, might possess some interest for the students of that family. I am aware that, in Mrs. Herbert Thomas's interesting communication ("Quarterly Journal of Microscopical Science," vol. iii., Plate V., Figs. 17 and 18), that lady has figured a very similar case in *Cosmarium margaritifera* to that shown in my drawing of *Staurostrum dejectum*; yet I have thought it might be worth while to figure some examples of the phenomenon still farther carried out in other genera, although it may be quite possible that even more curious aberrations may have been met with by other observers.

The first case of this mode of malformation to which I shall direct attention is a monstrosity of a variety of *Micrasterias Jenneri*—(Plate I., Fig. 9). Here the intervening growth, produced after the mode which prevails in the Desmidiaceæ, between the two older segments of the original frond, and which, in the normal condition, ought to have formed two new segments, forms a somewhat quadrate expansion, but has not assumed any definite outline. We find it within filled with endochrome, similar to the parent segments, to about the dimensions of one of which it has attained. It is about the simplest form of the irregularity under consideration which I have to bring forward; the intervening new portion forming only an irregular, shapeless growth.

I here wish to draw attention in passing to the form itself (Fig. 9), a fair idea of which in the normal state can be obtained by imagining the irregular central growth as absent, and the two older segments in apposition. It will be seen that this variety agrees with *Micrasterias Jenneri* (Ralfs) variety β , in the superficial granules being somewhat large, giving a somewhat dentate or roughish appearance to the margin, but it differs from both varieties, α and β , by its lateral lobes not being bipartite, and of course wanting their emarginate subdivisions. Thus, if Mr. Ralfs justly called this species, both α and β , puzzling, the drawing before us exhibits a form even more so. On account of the lobes not being incised, as just pointed out, this form (of course I need not repeat that I do not allude now to its abnormal irregularity) becomes, I think, likely to be mistaken for an *Euastrum*, to which genus it closely approaches through *E. oblongum*. Nor is the resemblance lessened by there occurring occasionally specimens with the incisions between the segments, not linear, and, therefore, the lobes not closely approximate, but spreading and sinuously lobed. However, the absence of any inflations, when viewed laterally, as well as the want of a terminal linear notch, though there is a slight concavity or depression at the ends, whilst the lobes are cuneate and more radiant, exclude this form from *Euastrum*. I would here, then, take the opportunity to characterize this plant thus:—

Microsterias Jenneri (Ralfs) var. γ .

Granules giving a rather rough appearance to the margin, lateral lobes concave, not bipartite, without emarginate subdivisions.

Locality : Bog, near Carrickmore, county of Tyrone. This very interesting variety occurred in the gathering kindly forwarded to me by the Rev. R. V. Dixon, and which also contained his new form, *Tetrachastrum mucronatum*.

In the monstrosity of *Staurostrum dejectum*, as shown in the drawing (Fig. 10), we have both the new segments well developed, and each possessing in the front view its own proper laterally projecting spines; but the interposed segments remain confluent throughout a portion of their terminal margins, forming a bluntly triangular notch at the sides, the whole making but one entire cavity, with the endochrome loosely scattered within. In the next case, that of *Arthrodesmus incus* (Fig. 11), the resulting fusion of the new growth, which ought to have formed two new segments, is even greater than in the preceding instance, so that the monstrosity almost represents an individual of three segments, so to speak. Here the interposed new growth has formed, projecting to each side, but one angle, looking as if but one new segment only had been formed, whereas, it must be due really to both segments and spines of the recently-grown portion being confluent. Of this malformation of *A. incus*, I have on several occasions seen specimens.

In the next drawing, showing a remarkable monstrous growth of *Euastrum didelta* (Fig. 12), we have a case somewhat similar to the preceding, but presenting additional odd aberrations. The upper and lower portions of the figure represent the side view of the older segments; between them the new growth has been formed; but here not only does the direction of the axis of growth assume a course at right angles to the older segments, but, what is curious, the plane of the new growth is at right angles to that of the older. In other words, the new growth, which has formed almost what might be called a new frond, not only has its ends projecting at right angles to the ends of the original one, but it also presents a front view, while the older segments show a side one. The interposed new growth, projecting laterally, has formed the usual linearly notched ends of the species, but one of them has assumed a twist obliquely out of the straight direction. The irregular space towards the centre of the specimen, as represented in the figure, denotes a portion of the side of the boundary wall, which, upon its inner surface, is there destitute of chlorophyll granules, affording an opportunity to look into the central cavity, which thereabouts is more or less empty, but the entire specimen being otherwise, and to all extremities filled with endochrome, in the ordinary manner, as in a normal individual.

I exhibit a nearly similar case in *Euastrum insigne* (Fig. 13); but the new growth has not assumed a different plane from the old, and it is not so deformed in appearance. Of this monstrosity I have met with two examples. The remaining case is represented by the two drawings which show a state of *Tetmemorus Brebissonii* (Figs. 14 & 15), somewhat similar to the preceding condition of *Euastrum didelta* and *E. insigne*. In one

the intervening growth has caused the old segments to become somewhat twisted in regard to each other, and, as in the preceding instances in *Euastrum*, it has assumed a direction at right angles to the axis of the older segments. The last sketch (Fig. 15), which represents a second instance met with by me of this phenomenon in the same species, shows that the lateral extremity to the right is really what ought to have been normally the new segment on a line with the lower older segment, and that projecting to the left the same for the upper, by reason of the fresh accession to the mass of endochrome, with its central series of corpuscles, being continued in an uninterrupted, curved manner from each of the older segments into the new. But the new laterally projecting segments do not in either instance form an equally armed cross, for what is wanting in their length as well as breadth, as compared with the old, goes to make up a somewhat quadrate central inflation. *Tetmemorus* not being a compressed form like *Euastrum*, there is not the same opportunity for the change of plane of growth shown by the case in that genus (Fig. 12), but that the new growth has assumed a slight twist, is shown by the different relative positions of the terminal emarginations.

The first figure of an abnormal *Tetmemorus* (Fig. 14) shows another state, though not bearing any connexion with the curious aberration of the external form, and that is the disposition of the cell-contents. The entire endochrome has become transformed into four green and four brown bodies, the latter the smaller, and smooth in outline. This, however, does not appear to have any dependence on the external abnormal condition, for I have frequently noticed the same transformation of the cell-contents, especially in this species, in the ordinary normally formed individual, as well as in many other species—for instance, in *Tetmemorus laevis*, *Micrasterias denticulata*, *Euastrum didelta*, several *Closteria*, and many others; and often to the entire absorption of the cell-contents to produce these spore-like bodies. In *Tetmemorus Brebissonii* I have seen from one to a dozen or so of these bodies, more often four only, sometimes green, sometimes red, and sometimes alternately red and green. I have not been able to see any further development of those spore-like bodies. The abnormal specimen from which the figure was taken I kept on a slide moistened for many weeks, but no alteration took place in this or any other respect, save that the red bodies, from being undefined, grew more and more smooth in outline. These are, doubtless, similar productions to those figured in the "British Desmidiæ," Plate IV., Fig. f, as occurring in *Desmidium Swartzii*. There, however, there is but one spore-like body formed in each joint. I have myself met with this species in the state so admirably figured in Ralfs; and though I kept the specimens for some time living, no further alteration took place beyond the decay of the old filament; and the spore-like bodies themselves subsequently perished. Bodies, which I suppose are of a similar nature, as is well known, are occasionally met with in species of *Spirogyra*, and which, as here, not being the result of conjugation, are formed by either a portion or the whole of the green contents of a single joint being absorbed in their production, and are spherical

and spinous. My friend, Mr. Edward Crowe, lately showed me specimens of *Zygnema*, in which the entire cell-contents of many joints of the filaments had become consolidated into a globose or somewhat pear-shaped and smooth spore-like body, which, by expansion in one direction towards one side, eventually burst through the boundary-wall, emerging into the surrounding water by the rupture thus effected. Mr. Crowe informs me that he was not able to trace their ultimate destiny, as they indeed perished before undergoing any further development. It is probable that these bodies, both in the Desmidiaceae to which I have above alluded, as well as the similar productions in the above-mentioned *Zygnemaceae*, in each case formed without conjugation, are Gonidia, by which the organisms may be severally propagated. It may not be out of place to mention here that I have several times noticed in *Closterium lunula* the entire cell-contents transformed into a dense longitudinal series of flask-shaped bodies, with their narrow necks projecting to the outer wall, precisely similar to those figured by Carter ("Annals of Natural History," 2nd series, vol. xvii., p. 114, Plate IX., Fig. 9), as occurring in *Spirogyra*, also by Henfrey ("Quart. Journ. Mic. Sci.," vol. vii., p. 27, Pl. III., Fig. 12), as occurring in his *Chlorosphaera Oliveri*, equivalent, I think, to *Eremosphaera viridis* (de Bary); and I imagine also the same as the *unicellular alga* mentioned by Hofmeister in his paper "On the Reproduction of the Desmidiaceae and Diatomeae," translated in "Annals of Natural History" (vol. i., 3rd series, p. 1, January, 1858). In my specimens of *Closterium lunula* alluded to, the longitudinal mass of these flask-shaped bodies more than once has suggested to me the hanks of onions as seen hanging up in the market. I have never seen them, however, to produce what Professor Henfrey considered the spermatozooids in his *Chlorosphaera*, which plant, as I have before elsewhere stated ("Natural History Review," vol. v., p. 258), though then without knowing that De Bary and Henfrey had named it, is of common occurrence in our district. Another curious growth in the interior of *Closterium lunula* I would just notice. I refer to the production, within the otherwise empty frond, of a slender jointed filament, contorted and twisted in every direction, and occasionally inosculating; the joints without any apparent contents, save a very few green granules, scattered at considerable intervals. This I should imagine a parasitic growth, possibly at the expense of the original cell contents, though it is questionable how the germ could find an entrance into the apparently uninjured cell. Such I also thought the flask-shaped bodies above mentioned, until I met with Professor Henfrey's remarks on the phenomenon in *Chlorosphaera*, nor does it quite appear that his conjecture is altogether proven.

Before attempting, in a measure, to account for the above described curious external aberrations from the normal form, it will, I think, be well briefly to draw attention to the mode of division in this family of Desmidiaceae. So far as I can make out, there can be little doubt that in these plants the first step in the process of division is the formation of a septum at the central space or isthmus, whereupon the segments become gradually removed more distant from each other by the growth

of a new cell-wall being interposed between them, eventually forming two new segments. At first the new growth is simple in outline, and pale in colour, but afterwards assumes the characteristic, more or less complex form and degree of tint of the species, and becomes filled with endochrome, exactly similar to the older segments; in the free species separation taking place, each older segment bearing with it a new one, to replace that from which it has been separated by the above-mentioned process of growth. According to Hofmeister (*loc. cit.*), "the new halves are at first lined only by the protruded portions of the pellicle of the contents belonging to the older half cells," and "it is the margin of the half shells which constitute the rings evident in many species, e. g., *Closterium*, *Docidium*," &c. I believe that the portion of each new segment first formed to be the end-lobe, beneath which, at each side, are then gradually evolved the lateral lobes. Nor can it be that certain specimens in *Micrasterias* and *Euastrum*, occasionally met with, are more than an apparent exception to this, in which the end-lobe is not only seemingly absent, but in which, in its place, a more or less deep *sinus* exists. For I should think the phenomenon referred to is due to the arrest of growth of the end-lobe, and which, not keeping pace with the expansion of the lateral lobes, is left behind, thus producing the sinus.

I would here like to remark, parenthetically, that I do not find that Hofmeister, in his paper alluded to, makes any reference to the circumstance of there being, occasionally at least, cast off, immediately after division, from each of the new segments a loose transparent coat, sometimes looking almost like two empty segments, with their ends towards each other, or back to back. What I refer to is well shown by Mrs. Herbert Thomas (*loc. cit.*, Plate V., Figs. 13 and 21) in the object of her study, *Cosmarium margaritiferrum* and *C. Thwaitesii*. I have seen similar in other species, especially smooth ones, such as *Cosmarium Ralfsii*, *Cosmarium undulatum*, &c. It does not appear to me evident what this pellicle-like production may be. It seems to me to be *possibly* only, as it were, the matrix of gelatine formed during the act of division and fresh growth, which may have become denser and firmer, and from which the fronds then emerging and leaving it behind, give rise to a membranous appearance with the doubly cup-shaped outline; or it may possibly be a secretion deposited superficially during growth, even more comparable than the usual gelatinous investment to what in the higher plants is called "cuticle," and which in them is occasionally separable by peculiar treatment. In the growing Desmidiaceae referred to, this investing pellicle-like production, however, does not extend beyond the new segments, ceasing at the sutures. It is sometimes particularly remarkable in *Docidium* (in *D. clavatum* I have noticed it), because it forms two lengthened tubes (each, indeed, as long as one of the new segments, and closely applied thereto), in apposition at the closed ends and open at the opposite, from out of which the fronds are to emerge, and indistinguishable till the process has commenced. This may be witnessed under the microscope during its accomplishment, when it is seen that near the open ends the cast-off tube is of a slightly

undulated outline; in fact, a cast from the new segments. In this species the segments appear to me to possess one or two slight basal inflations, though described as with only one in "British Desmidiæ." I believe it, however, to be quite distinct from *D. Ehrenbergii*.—Whether a hyaline pellicle-like investment, sometimes met with, entirely surrounding certain single individuals, and apparently like a loose tunic, is anything analogous to the above-mentioned production, I cannot pretend to say; but I have occasionally seen such in some species,—for example, *Euastrum didelta*. This involving cyst does not follow the boundary of the form, but is of a rounded or oval outline, and generally, when I have noticed it, the contained frond seemed to have lost vitality, the endochrome being brownish. What I allude to is not to be mistaken for the gelatinous investment surrounding the frond in so many Desmidian species, being altogether different from anything of the sort seen in fresh specimens. Possibly, like the former, it may be due to its consolidation—here producing, by a process of superficial condensation, as it were, a kind of skin, from beneath which the intervening gelatinous substance has been absorbed. I hazard such a conjecture the more, because something very like this seems actually to occur in some species of *Glœocapsa*, or allied forms, in which the concentric gelatinous layers seem to harden into so many frangible investments.

In the foregoing very brief account of the mode of cell-division which occurs in this family, it will be noticed that I look upon the formation of a septum at the isthmus as the preliminary or initial step in the process. Now it appears to me that the accompanying figures represent individuals, which, having taken on them the vegetative growth, or effort to repeat themselves by transverse division, through some inexplicable cause have omitted the formation of a septum. This not having taken place simultaneously with the vegetative activity being aroused, which, being in full energy, proceeded to the development of new growth, which, according to the law which prevails in this family, took place, as usual, between the older segments, in consequence, therefore, the resulting formation in each case consisted of but one cavity, and fresh endochrome being formed, they each became entirely filled. Nor do I think some instances lately under observation, and to which I will just allude, are a contradiction to this. Specimens of *Penium cylindrus*, to all appearance perfectly healthy, and manifestly undergoing growth, lately occurred to me; of these, a few individuals presented themselves, in which various stages of the new growth, produced in the usual manner in this species on a line with the older segments, had been accomplished, in some cases the fronds having attained to double the ordinary length—but in none of the instances referred to was any appearance of a septum evident. That the fronds had added to their length by recent new growth was proved by its usual colourless cell-wall, as compared with the red-tinted older segments. That there was no septum was proved by the granular particles partaking of a circulatory motion at and past the central point; and indeed, when present, it is readily seen as a transverse line. No further alteration took place

in these specimens kept for some time on a slide. Notwithstanding their not very unusual appearance, for the absence of the central septum was not very striking, and might not be noticed at first sight, unless closely looked into, as well as there being no external aberration in form, it appears to me that the specimens of *Penium cylindrus* alluded to were so many illustrations of the same abnormal mode of growth, extreme cases of which I have tried to depict in the drawings. For I cannot easily understand, without the original separation of the primordial utricle with the contents, and the formation round it at the ends of new cell-wall, how an articulation could exist to allow of the ultimate separation into two fronds of the old segments with the portion that should appertain to each of the newly grown structure.

What causes the change in the direction of the axis of growth in the specimens represented by some of the figures, does not appear to me so readily to be accounted for. In each case I should suppose the plant would cease to grow, and the abnormal individual perish, unless, indeed, each or any might be supposed to possess the power of afterwards forming a septum at the suture connecting the newly-grown portion with the older segments, a second new growth becoming then interposed, and the central misshapen structure thus becoming eliminated.

Mr. Horatio Yeates sent for exhibition to the Society a new microscope-stand of his construction, and in his absence it was kindly brought forward and shown to the meeting by the Rev. Eugene O'Meara, who drew attention to the modifications adopted, and explained their purpose. This is an exceedingly simple and ingenious little instrument, supplied with a rotatory stage, and combining its advantages with that of obviating any necessity for centering. The compound body is firmly attached by an oblique arm to the margin of the rotatory stage, and, revolving along with it, the optical axis of the instrument thus always remains in the same relative position in regard to the object. The mirror is attached to a radius bar fixed at the back of the stage, thus affording any degree of obliquity of light, and permitting its use above the stage for opaque objects. The stage does not possess vertical or transverse movements, but these, if required, could readily be added; and, doubtless, amongst the recommendations possessed by this instrument, there might be counted the greater cheapness with which it could be produced, as compared with much larger microscopes, of higher pretensions, involving costly contrivances for accomplishing the foregoing ends.

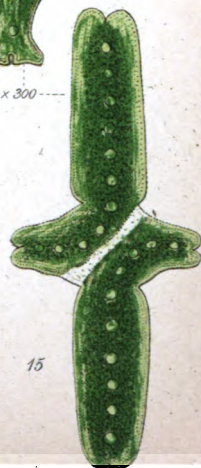
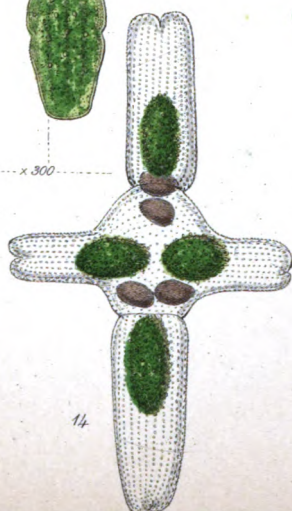
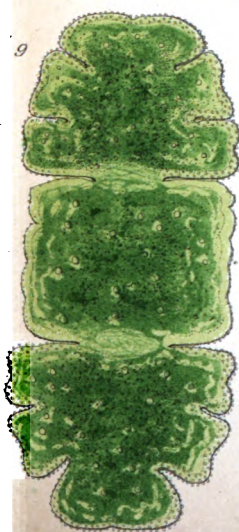
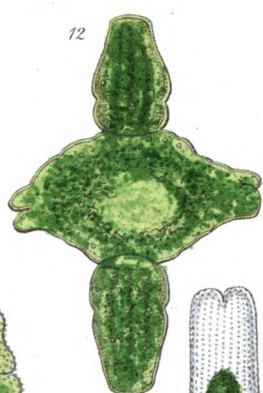
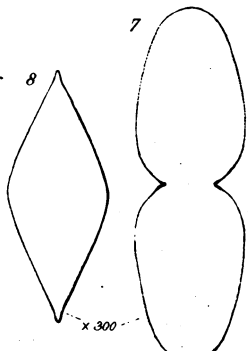
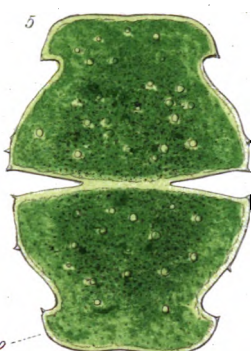
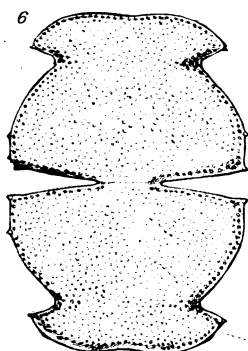
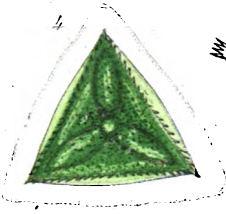
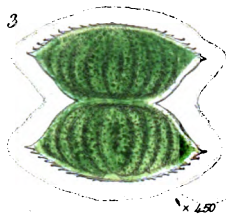
Mr. Sanders said he had been much pleased by an inspection of Mr. Yeates' new stand, which, not only from its simplicity, but from its apparent adaptation to the purposes in view, seemed calculated to become very valuable to the microscopist. It had always been a desideratum in several departments of research, to be able to cause the object to revolve so as to expose each side of it successively to the light; but which, owing to the inevitable imperfection of even the best workmanship, was difficult to accomplish without involving much trouble and loss of time in adjusting the centering of the body of the instrument in regard to the ob-

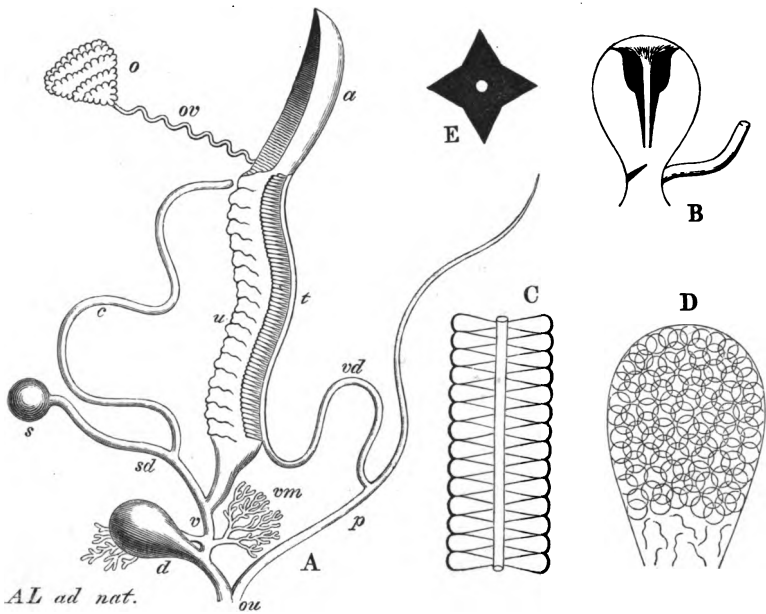
ject. The plan employed in that shown to-night by Mr. Yeates seemed to obviate this altogether; and, even should there be a slight defect in the concentricity of the rotatory movement of the stage, the compound body revolving along with it, would, as it were, follow the error (even supposing it to exist), thus fulfilling the end in view more successfully, and without the inconvenience of any contrivance for centering.

A vote of thanks was then passed to Mr. Yeates for his kindness in bringing forward his microscope before the Society.

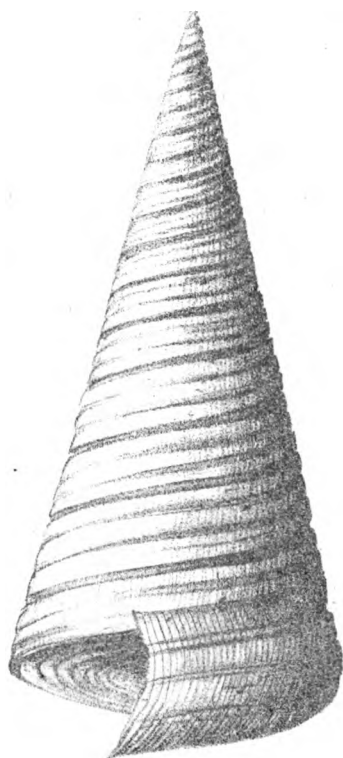
A ballot then took place, when the following gentlemen were declared duly elected as Ordinary Members:—Professor Cameron, M. D., and William White, Esq., Rathmines; and as Corresponding Member, the Rev. Robert Vickers Dixon, A. M., Ex-F.T.C.D., Clogherney Rectory, Dungannon.

The President, in offering a few brief words before adjourning, took occasion to thank the Society at large for the support tendered, and the courtesy extended towards him since he occupied the chair, as well as for the readiness evinced, when necessary, to uphold the dignity of the Society, while he congratulated them upon so successful a session as regards the importance and interest of the papers read before them at the General Meetings. He then adjourned the Society to the first Friday in November.





ANATOMY OF GENERATIVE SYSTEM OF *HELIX ASPERSA* AND
HELIX HORTENSIS.



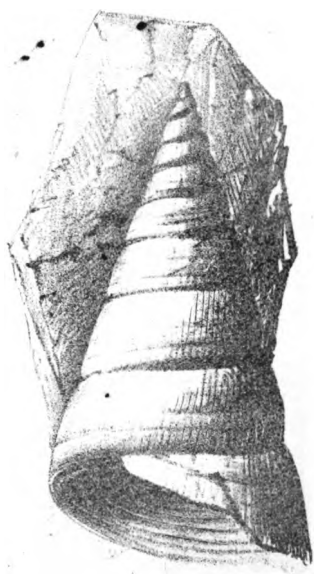
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